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PRACTICAL PHOTOGRAPHY,

ON

Glass and Paper,

A MANUAL,

CONTAINING SIMPLE DIRECTIONS FOR THE PRODUCTION OF
PORTRAITS, VIEWS, &c.
BY THE AGENCY OF LIGHT,
INCLUDING THE
COLLODION, ALBUMEN, CALOTYPE, WAXED PAPER, AND POSITIVE PAPER PROCESSES;
TO WHICH IS ADDED
A PAPER ON THE METHOD OF TAKING
STEREOSCOPIC PICTURES.

BY

CHARLES A. LONG.

SECOND EDITION.

LONDON:
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1856.

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PREFACE TO FIRST EDITION.

In the following pages I purpose to confine myself to a description of the Photographic processes on Paper and Glass, as being the two modes of fixing the luminous image that present the most difficulties to the beginner, and, moreover, are those which at the present time are occupying to the greatest extent the attention of the Photographic world.

Almost every one who has commenced this beautiful and fascinating Art, has felt the want to a greater or less extent of some Work which shall contain such simple and definite instructions as will enable him to succeed in the particular processes in which he may be engaged. It will therefore be my endeavour to transcribe to these pages the results of actual experiment, and to lay down those rules for the practice of the various processes which experience has shown to be attended with most success.

In carrying out this design, many variations in the processes will necessarily be omitted, but this will be found a convenience rather than the reverse to the beginner, as it is a generally admitted fact, that those Photographers who are content to follow some good process to the exclusion of others that have been but imperfectly tried, produce by far the best pictures with the least expenditure of time and trouble.

CHARLES A. LONG.

July, 1854.

PREFACE TO SECOND EDITION.

In presenting a new edition of this Work to the notice of Photographers and the Public, I would remark, that feeling assured of the success of the former edition in rendering assistance to the tyro in this beautiful and interesting Art, I have considered it best to adhere to the same simple and concise mode of treating the subject, merely adding observations from time to time that experience has shown to be desirable for the explanation of some difficulties that may arise in the path of the beginner.

The new Waxed Paper Process will be found to possess considerable advantages, and will, I trust, meet all the requirements of the Photographic Tourist; and the paper on the mode of taking Stereoscopic pictures, will, it is hoped, enable those highly interesting and wonderful productions to find a place in every portfolio.

CHARLES A. LONG.

July, 1856.

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THE DARK ROOM.

The room in which the various operations in the Photographic processes about to be described are conducted, should be so constructed that every ray of light can, if necessary, be shut out, especial care being bestowed on the exclusion of that element under and around the door: it is better if there be only one window, near which may be placed the operating table. The light from the window must be modified by placing before it a triple thickness of yellow calico; the light which enters through this screen will not affect the sensitive surfaces, but will enable the operator to conduct the process with ease and comfort. Should a window not be at command, the light of a lamp, surrounded with ruby or yellow glass, can be used with advantage. (*Figs.* 1 & 2.)

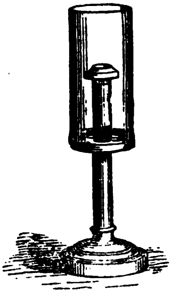


Fig. 1.

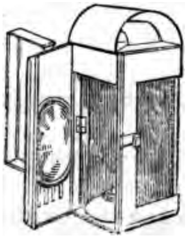


Fig. 2.

It will be found convenient when using the Paper process to have a broad shelf fitted up to hold three or four washing pans; this will answer well at the same time for pinning the paper to while drying. A small shelf near the table will also be a convenience as a resting place for the bottles containing the chemicals; this enables the table to be kept quite clear and fit.

for action, which will be found a great advantage, and will tend much to the success of the various processes.

A pan of clean water and some clean cloths may be advantageously placed near at hand, as likewise vessels for the refuse waters and liquids used in the production of pictures.

The cloths and leathers used in the Collodion process ought to be hung on separate hooks, so as to be kept quite distinct and within reach, and each one should be returned to its place when done with.

The solutions in all the processes require frequently to be filtered; and it may be of service to the novice to describe the way of folding the bibulous paper to be used in the operation. Cut a circle of the paper of twice the diameter of the funnel to be used, and first fold it in half and then in quarter; it will now be found to fit the funnel exactly. The paper is folded in precisely the same way when used with the filter ring.

These remarks will no doubt appear quite unnecessary to many Photographers, now adepts in the art, but I would merely remind them that it has been by attention to minute and apparently trivial matters that they have attained their present proficiency.

THE PHOTOGRAPHIC PROCESSES.

Before entering upon the details of the Photographic processes, it may not be out of place to give some account of the chemical substances used in Photography, and also to make a few observations on their behaviour under certain conditions.

The following list contains the usual chemical preparations concerned in the formation of the Photographic image:

Iodide of potassium.
Nitrate of silver.
Gallic acid.
Pyrogallic acid.
Acetic acid.
Proto-sulphate of iron.
Hypo-sulphite of soda.

To commence then with IODIDE OF POTASSIUM. This salt, consisting of iodine combined with the metal potassium, is formed by saturating a hot solution of pure potassa with iodine which gives rise to iodide of potassium and iodate of potash. This is evaporated to dryness and exposed to a gentle red heat in a platinum crucible in order to decompose the iodate. The fused mass is then dissolved in water and crystallized.

The photographer should be particularly careful in the purchase of this salt, as it is frequently contaminated with various impurities which render it perfectly useless in Photography. The most usual contaminations are chloride of potassium, and carbonate and sulphate of potassa, either of which would have an injurious effect on its qualities.

Pure iodide of potassium is in crystals of the cubic form, white and opaque, that do not deliquesce in a moderately dry atmosphere, and are perfectly soluble in absolute alcohol.

NITRATE OF SILVER is formed by dissolving pure silver in nitric acid diluted with three times its bulk of water: the solution is evaporated, and crystals of nitrate of silver are deposited in the form of transparent tables on the cooling of the liquid. These are dissolved in water and again crystallized, in order to free them from any adhering nitric acid.

Nitrate of silver is met with in commerce in two states, one in the form of crystals, as just described, and the other in small cylindrical sticks; these latter should be rejected by the photographer, as containing many impurities and contaminations which are not found in the crystallized article. The foreign matters found in the nitrate of silver of commerce are, lead, copper, and potash, each in the state of nitrate. The whole of these impurities are detrimental to the proper action of the nitrate of silver in the various Photographic processes.

GALLIC ACID.—If powdered Aleppo galls be mixed with water to the consistency of a thin paste, and exposed to the action of the atmosphere at a temperature of 65° for a period of four or five weeks, the evaporation being neutralized by the addition of small quantities of water, they will become mouldy: the liquid is then pressed out and the residue boiled in water. The resulting hot solution must now be filtered, and as it cools will deposit beautiful crystals of gallic acid; these are to be boiled in water with some animal charcoal, and the solution again filtered, when on cooling the gallic acid will crystallize in the form of slender needles, having a silky lustre. The gallic acid should be of a light yellow colour, and perfectly free from dark portions; and when dissolved should make a bright and clear solution. 1 oz. of water will dissolve about 4 grs. of gallic acid at the temperature of 60°.

PYROGALLIC ACID.—This beautiful substance is obtained by submitting gallic acid in suitable apparatus to a temperature of 430° Fah., when pyrogallic acid in the form of bright shining scales sublimes and is condensed in the upper part of the vessel. The scales ought to be quite white and free from any tinge of brown, otherwise we may conclude that they have become contaminated with an empyreumatic oil, and that the temperature at which they had been formed was too high.

The only other impurity likely to be discovered in pyrogallic acid is metagallic acid, which is produced from the same cause as the oil mentioned above. The first impurity causes the pyrogallic acid, when mixed ready for developing the picture, to decompose more readily; and the second, if not carefully separated by filtration, causes innumerable blemishes on the surface of the plate.

ACETIC ACID (glacial) is the result of the decomposition of acetate of soda, which has been thoroughly purified by repeated crystallizations, by sulphuric acid; the acetic acid distilling over at a temperature of 125°. The first product is then re-distilled over some dry acetate of soda, and the product submitted to the action of cold until it assumes the solid form; the liquid is then drained from the crystals, which are pure hydrated acetie acid.

There are various impurities in the ordinary strong acetic acid, such as sulphuric, tartaric, oxalic, and hydrochloric acids; but if the article be carefully prepared, we need not be apprehensive of any contamination. It is above all things necessary that the acetic acid should be of good quality, as so much of the brilliancy and clearness of the pictures produced with it depend on its purity and strengh.

PROTO-SULPHATE OF IRON.—This salt is obtained by treating metallic iron with dilute sulphuric acid, the liquid on evaporation yielding crystals of a bluish green colour, which after being dissolved and re-crystallized form the pure proto-sulphate of iron. The only impurity of consequence in this salt is due to the peroxidation of part of the base; this, however, may be easily detected by the crystals becoming slightly tinged with yellow. Any indication of the kind in a sample ought to be sufficient grounds for its rejection by the photographer.

HYPO-SULPHITE OF SODA.—There are various ways in which this salt can be made; the following appears to be the most simple:—

Mix 1 lb. of finely pulverized calcined carbonate of soda with 10 ozs. of flowers of sulphur; heat the mixture slowly till the sulphur melts; stir the fused mass so as to expose all its parts freely to the atmosphere; then dissolve in water, filter the solution, and boil it immediately with flowers of sulphur. On cooling, after being filtered, it will deposit beautiful crystals of the hypo-sulphite of soda. The only impurity likely to interfere with the photographic use of hypo-sulphite, is the sulphate of soda; but this may be easily detected by the crystals looking dry instead of slightly damp.

From the foregoing remarks it will be seen how necessary it is to be careful in the selection of the chemicals we are about to use; and I venture to assert that more failures have arisen from inattention to this particular than from any other cause.

THE COLLODION PROCESS.

IN the year 1851 Mr. Scott Archer made known to the world a process by which he had succeeded in taking impressions in the Camera on a film of collodion spread upon a plate of glass.

His process varied very little from that now most recommended except in a few particulars of manipulation, which practice has shown to be essential to success.

The advantages of such a process had been long admitted, but up to this point nothing of great service had been proposed except that on albumenized glass, which, from the slowness of its action, was useless for portraiture, and almost so for many other purposes.

The transparency of glass plates, and the film of collodion, as compared with the uneven texture of paper, is a strong argument in its favour; but when we superadd the extreme sensitiveness of the collodion plate, and the ease in the manipulation, nothing more can be desired for obtaining perfect representations of natural objects.

The apparatus required for the Collodion process is a very simple kind, and consists of the subjoined articles:—

Gutta-percha bath, for holding the nitrate of silver.

The dipper, which consists of a strip of flat glass, having a small support cemented at one extremity for the purpose of holding the glass plate while it is being plunged into the bath.

Levelling stand, with proper adjusting screws for supporting the plate, while the picture is being either developed or fixed.

2 ounce measure.

1 ounce ditto, for developing solution.

Small-spouted cup, for hypo-sulphite of soda.

Funnel, and filter-ring; the former for the filtration of the bath, the latter for the purpose of filtering small quantities of developing solution before use.

Porcelain pan, to hold the levelling stand in order to catch the superfluous liquid.

Collodion is a solution of gun-cotton in sulphuric æther, and the qualities that fit it for Photographic purposes are, capability of being rendered extremely sensitive to light, toughness, tenacity, and freedom from impurities of any kind.

These objects will be attained by following the method we are about to describe in all its details, the principal points requiring attention being the strength of the various chemical preparations, and the space of time the cotton is exposed to the action of the acid. The mode of proceeding is as follows :—

Take ⅓ lb. of purified nitrate of potash in powder and throw it into an evaporating dish placed in any convenient manner under a chimney or in the open air; next weigh ⅓ oz. of best carded cotton perfectly free from impurities, and having pulled out the fibres place it near at hand. Then add to the nitrate of potash 9 oz. by measure of sulphuric acid of the specific gravity 1860, and having thoroughly mixed them with two stout glass rods, add in portions at a time the carded cotton, taking care that every fibre is brought in contact with the nitric acid which is being disengaged. The cotton which assumes a sort of pulpy consistence, must now be kneaded with the glass rods for the space of five minutes, taking care that during the whole operation the cotton is entirely covered with the acid. This precaution is necessary, and forms one of the principal points to be attended to in the manufacture, because if the cotton become exposed to the action of the air, or if any air become enclosed in the interstices of the cotton, it not only protects the fibres from the action of the nitric acid, but causes a great and rapid disengagement of nitrous fumes, which have a very prejudicial effect on the solubility of the cotton produced. After being submitted to the above operation for five minutes, the cotton is to be removed quickly to a large vessel of cold water in order to dissolve the adherent sulphate of potash, and to clear it of any sulphuric acid that has not been used in the process. This washing is best accomplished in practice by placing the cotton, after its removal from the first pan of water, in a shallow trough, so constructed that a stream of cold water may constantly flow through it and carry away all soluble matter. When the cotton, on being tested with blue litmus paper, ceases to give a red tinge, it may be transferred to a pan of distilled water and allowed to soak for an hour or two, in order further to free it from any impurity. It is then to be pressed to separate the water, and spread out in a warm place exposed to a current of air to dry.

It is necessary in the above operations to be quite prepared with all the materials and appliances close at hand, otherwise the greater portion of the nitric acid formed will have escaped in vapour before the cotton can be brought in contact with it; and also, if time be lost in the transference of the cotton to the washing pan, a deterioration will take place in its quality.

Should the operator find that, from the action of air enclosed in the cotton, the nitrous fumes are beginning to arise, which may easily be ascertained by a peculiar hissing sound emanating from the compound owing to the disengagement of the gas, he must lose no time in changing the position of the cotton in order to bring the acid in contact with the part of the mass in question.

By following the above directions carefully any one can ensure making a cotton that shall be perfectly soluble, and one that will give the essentials of toughness and tenacity to the collodion made with it.

The next part of the process is to bring the cotton prepared as above to a state of solution. This is accomplished in the following manner:—

Place 100 grains of the prepared cotton in a one-pint bottle, and pour on to it 10 drachms of alcohol of the specific gravity ·840. Agitate so as to saturate the cotton with the alcohol, and then add 18 oz. by measure of sulphuric æther, of specific gravity ·745. Agitation must be kept up until the whole of the cotton is dissolved, which will be in three or four minutes if it has been properly prepared in the first instance. The bottle containing the above is now to be set aside to allow the collodion to clear, which it will do in the course of 36 hours by the deposition of some of the fine fibres of the cotton that are insoluble in the æther.

The reason of adding alcohol to the cotton before dissolving in the æther is, that it may be taken up more readily; for if we treat the cotton with very strong æther it will not be dissolved, but immediately on the addition of a small quantity of alcohol it is entirely taken up.

NEGATIVE COLLODION PROCESS.

Having prepared our Collodion as before directed, and drawn it off from the sediment in the bottle, the next point to which we turn our attention is, to impregnate it with some soluble iodide—in fact, to iodize it.

Many methods to effect this object have been published from time to time, each, according to the discoverer, possessing advantages above all others. I shall, however, confine myself to a description of the process that, after long experience, appears to me to fulfil all the necessary conditions in the most complete and simple manner.

IODIZING SOLUTION FOR NEGATIVE COLLODION.

The plan which I adopt, and one that is liable to fewer objections and accidents than any hitherto proposed, is simply to dissolve 4 grains of iodide of potassium in 2 drachms of alcohol, of the specific gravity ·840, and after filtration through bibulous paper, add this quantity to 6 drachms of collodion, prepared as before directed. Collodion iodized in this manner, will be found to give excellent half-tones, and at the same time furnish negatives of great intensity and vigour, capable of producing pictures of great beauty when printed on paper.

SOLUTIONS REQUIRED IN THE NEGATIVE COLLODION PROCESS.

Nitrate of Silver Bath.—This bath requires great care in its preparation, as much of the success of the process depends on its proper composition—the formula which I have used as yielding the best results is the following:—

Pure nitrate of silver in crystals .	1¼ ounces.
Distilled water	20 ounces.
Iodide of potassium	10 grains.

The bottle containing these ingredients is to be well shaken at intervals, and allowed to remain in a warm place for a few hours, the contents may then be filtered into a *perfectly clean* bottle for use.

Before, however, we can make sure of obtaining a perfectly clear picture in this bath, it is necessary to test it as to the degree of neutrality it exhibits, and this is accomplished by allowing a drop of the clear filtered solution to fall on a piece of blue litmus paper; if after the lapse of a minute no alteration takes place in the colour, we may conclude that the bath is quite neutral; if, on the contrary, the blue colour of the paper is changed to a tint verging on green, we may conclude that the bath is in an alkaline condition; and if on a third trial we find the litmus paper changes in tint from blue to red, we may argue that an acid condition pervades the bath. In the case of the two former conditions obtaining, it is necessary to add one or two drops of *pure* glacial acetic acid to the bath, and to test it with the litmus paper between each addition until we find that the drop of bath on the blue litmus paper just changes the colour to a pink (not red); on the contrary, if on the first trial the litmus paper indicate a decidedly acid reaction, we must add, drop by drop, a dilute solution of ammonia, until the pink colour is obtained on testing with a fresh piece of litmus paper.

We have been thus explicit in the manner of accomplishing this important condition of the bath for two reasons—first, because so much of the beauty of the negatives produced depends on the state of the bath, and second, although a simple matter, there are many beginners in the art who might stumble thus early in their experiments and ever fail to become proficients from a want of knowledge of the properties requisite in a good bath.

DEVELOPING SOLUTION FOR NEGATIVES.

The solution which I have found to give the best results, and the formula for which there appears, after long trial, no reason to alter, is composed as follows:—

Pyrogallic acid	3 grains.
Glacial acetic acid	1 drachm.
Distilled water	2 ounces.

Dissolve the pyrogallic acid in the distilled water, and then add the acetic acid. If the solution should present any appearance of turbidness, it must be filtered carefully through bibulous paper in order to render it perfectly bright and clear.

FIXING SOLUTION FOR NEGATIVES.

This consists simply of a solution of hypo-sulphite of soda in water, the quantities are noted in the following formula:—

Hypo-sulphite of soda . . .	8 ounces.
Water (distilled or rain) . . .	20 ounces.

There is no necessity for this solution to be filtered except to free it from any gross impurities.

The solutions being all prepared, we shall next proceed to give as detailed and simple an account as possible of the manipulatory part of the process; and let me here impress on the mind of the novice in such matters, that next to ABSOLUTELY PURE CHEMICALS, cleanliness is of the highest importance, and that he cannot hope for success unless great attention be paid to this particular.

The manipulation is divided into seven distinct operations, viz., cleaning the plate, spreading the collodion film, exciting the plate or rendering it sensitive, exposure to the action of light, development of the image, fixing the proof, and finally varnishing the picture, to prevent injury to the surface while taking the positive on paper.

CLEANING THE PLATE.

The plate, which should be ground at the edges, is to be thoroughly washed in abundance of water, dried on clean linen cloths, and finished by being rubbed with a piece of perfectly clean wash leather, one that has been passed through several clean waters to free it from the dressing that exists in it at the time of purchasing.

There is no occasion whatever for the use of nitric acid, potash, soda, or ammonia; all of these substances increase the chances of accident, without giving a corresponding equivalent in their cleaning qualities.

The plate being thoroughly clean, we proceed to the second operation—

SPREADING THE FILM.

This is best accomplished in the manner following:—Hold the plate by the corner (A, *Fig.* 3) between the thumb and forefinger of the left hand, and having previously freed the collodion bottle from any particles of dry collodion which may be adhering to it, pour a good quantity of the collodion on the plate at about the point (E), then by gently tilting the plate firstly towards the corner (C), secondly to (D), then to (A), taking care that the collodion does not touch the thumb, and lastly to (B); we shall find the plate perfectly covered with the film, and the superfluous quantity in the best position for returning to the bottle, which being done, the plate is still to be kept slightly inclined so that the corner (B) may be lowest; and the lip of the bottle is to be drawn gradually in contact with the edge of the glass from (B) to (A), in order to correct in a great measure the tendency which the collodion has to form streaks across the glass plate: this it accomplishes by laying hold as it were of the film, and shifting its position slightly on the surface of the glass. The operation of coating the plate ought to be performed as quickly as possible, as the evaporation which takes place from such an extended surface of collodion gives rise to the loss of so much æther as to render the collodion returned from the plate almost useless, if the operation be delayed beyond a certain time.

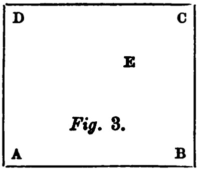


Fig. 3.

The accompanying cut (*Fig.* 4) will convey an idea of the way in which the plate is to be held; in the drawing we are supposed to be facing the operator.

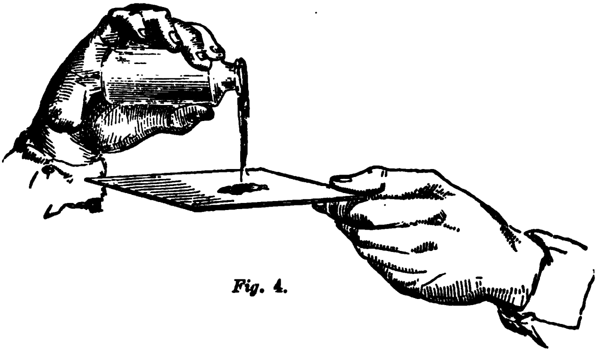


Fig. 4.

RENDERING THE PLATE SENSITIVE.

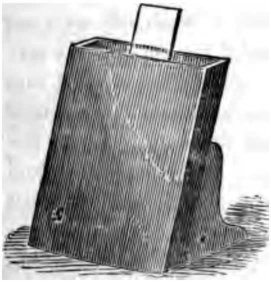


Fig. 5.

As soon as the collodion film has become set, the plate is to be placed on the dipper, and immediately plunged into the nitrate of silver bath (*Fig.* 5)—this must be done at one stroke: there must be no stoppage during its descent into the bath; otherwise, wherever such pause has taken place there will be a line on the picture, which will give evidence of its existence in the subsequent part of the process.

After leaving the plate immersed for about half a minute, withdraw it carefully; the surface will have changed its aspect, and become of a yellowish colour, and will furthermore be covered with streaks, just as if the plate had been previously oiled. It must be immediately returned to the bath, and moved once or twice briskly up and down at intervals through the space of two minutes when the thermometer is at about 60° Fah., but if lower, longer time may be allowed in the bath. It will be found on removal that the whole of what is technically called greasiness is gone off, and that the liquid flows quite freely over the surface.

The plate is now removed from the bath, and held with one corner downwards to drain for a moment or so: it is then ready for placing in the dark frame of the camera.

Great difficulty, I am fully aware, is experienced by beginners, in knowing how long the plate, after having the collodion poured on to it, ought to remain before immersion in the bath. This difficulty, like many others, will vanish in a very short time, if proper attention be devoted to the appearance of the film under different circumstances. For instance, if the operator find that it takes some considerable time before the film becomes of an opalescent hue, he may safely conclude that the plate has remained out of the bath for too long a time; if, on the contrary, there is any tendency of the iodide of silver formed on the plate, immediately on its immersion in the bath, to wash off—as is not unfrequently the case, especially at one of the corners—he may assuredly predict that the collodion had not become set, and that in future operations with that collodion, he must allow a longer period to elapse before immersing it in the bath. A very few experiments will suffice to show the truth of these remarks, and also the necessity for great caution in manipulation. It must always be remembered, after we have been working from one bottle of collodion for any length of time, that the æther has considerably diminished in quantity, in proportion to the alcohol present in the collodion; so that we shall have to defer the immersion of the plate in the bath, in proportion to the amount of exposure the collodion has had in our previous operations. This may appear to many a point of minor importance, but it is scarcely credible the stumbling-block it is in the path of the inexperienced.

Another difficulty experienced by the uninitiated is, the length of time that the plate should remain under the action of the bath, in order to give it the greatest amount of sensitiveness. This varies with the temperature, and appears to be entirely dependent upon it; but it will be found that at the temperature of 60° Fah., two minutes is quite sufficient to render the film sensitive. If, as stated before, the thermometer falls below 50° Fah., longer time—say from three to four minutes—must be allowed to elapse before the final removal of the plate from the bath; but, on the contrary, if the temperature be considerably above 60°, as in the height of summer, the time of immersion must be curtailed in proportion.

Having pointed out these difficulties, and also indicated a way to surmount them, we must leave it to the industry and judgment of the operator to prevent their recurrence, and consider that he has prepared his plate ready for the next step in the process—

EXPOSURE IN THE CAMERA.

This is a point of the greatest nicety, and one which taxes the judgment of experienced operators very severely, especially in a climate like ours, where there is a continual variation in the intensity of the light.

In the case of a portrait, the sitter ought to be so placed that he may be well and equably illumined, taking care that the eyes are protected by blinds, or some contrivance, from any great glare of light, which would inevitably give a false expression to the face, and consequently spoil the likeness. The aspect best adapted for the purpose is the northern, which, of course, is free from the glare complained of, and at the same time reflects light of superior photographic quality.

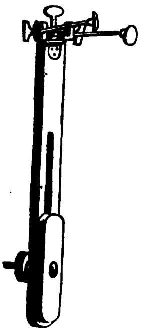


Fig. 6.

Care should be taken that the sitter does not move during the operation: this is best accomplished by having the chair furnished at its back with a head-rest *(Fig. 6)*, which will prevent the nervous jerk we are so apt to give when sitting in one posture for a few moments together.

The figure being posed to our satisfaction, it is necessary to bring the image to a focus on the ground glass of the camera, and this should be done carefully, as much of the success depends on its proper adjustment.

We now proceed to expose the plate to the action of the light passing through the lens. The precise time of exposure must depend entirely on the judgment of the operator; all we can do in the matter is, to give such general directions as may assist in forming it, and we cannot do better than by instancing cases of *under-exposure* and *over-exposure*. If we find on developing the image that the parts of the picture which were in the best light—such as the forehead, the shirt-front, &c.—make their appearance with some difficulty, and that the parts not so well-illumined fail to be at all perceptible, we may conclude that the plate has been under-exposed; but if, on the contrary, the parts that were in comparative shadow are developed as soon as the high lights, we shall find that too long an exposure has been given to the sensitive plate.

The way in which a picture develops itself that has undergone the right amount of exposure is—first, the shirt-front appears; next, the forehead and the light side of the face; then the parts which are not so well illumined; and lastly, the deep shadows become developed.

It is a curious fact, that a picture that has been over-exposed, instead of being extremely dense, as we should naturally expect, loses its vigour in a remarkable degree. While we are viewing it by reflected light, it appears a most solid and vigorous proof; but on holding it between the eye and the light, we shall at once find that the high lights of the picture are scarcely more dense than the background; and instead of a picture that would give a good positive on paper, we shall have one that will scarcely bear printing at all.

We must suppose that the plate has been exposed properly in the camera, and that we are about to

DEVELOP THE PICTURE.

In order to do this, we remove it carefully from the dark slide, and place it face upwards on the levelling stand, (*Fig.* 7), which has been previously adjusted by means of the screws mentioned before. We now prepare the solution by placing in the small measure,

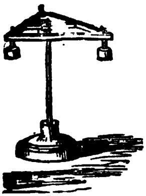


Fig. 7.

for the 5 in. by 4 in. plate, 10 drops of nitrate of silver solution, of the strength of 50 grains to the ounce, adding thereto 4 drachms of the developing solution for negatives, at page 17. This mixture is then to be poured over the plate as quickly as possible, so as to bring every part under its influence as soon as practicable. As this is a point of some nicety in the manipulation, it may be as well to endeavour to describe as accurately as we can the mode of procedure. Take the measure in the right hand, and beginning at the right hand corner nearest to you, pour on the solution, giving the hand while performing the operation somewhat the motion that would be required for throwing a quoit: this must not be done too quickly nor with too great force, otherwise stains will appear on the plate at that point where we first poured on the developing solution. The reason of this is, evidently, the forcible removal of the film of nitrate of silver still adhering to the plate after its immersion in the bath when being rendered sensitive.

The picture will begin now to appear: the high lights will first come out, then the half-tints, and lastly, the deeper shadows.

During the time that all this is taking place, it is necessary to keep the fluid in motion, in order that the action may be more equal all over the plate. This is best accomplished by gently blowing on the surface in different parts, taking care that it is so gently done that no part of the plate is left dry for any time, no matter however short. It can be ascertained when the picture is sufficiently developed, by simply holding a piece of white paper underneath the glass plate in such a manner that the light reflected from it may traverse the impression. If the operation has been continued sufficiently long, the dark parts will have an intensity according to the exposure, and the parts where the light has not acted will be perfectly transparent and clear; but if, on the contrary, the plate has been subjected to too long an action of the developing solution, the parts that ought to be clear will present a muddy appearance, and there will be a deposit of silver in a minute state of division all over the plate; and further, there will not be that fine variety in the half-tones which characterise a good and successful negative.

During the development, the solution on the plate ought not to become muddy, otherwise the picture will be devoid of clearness If the operator find that such an effect is coming on, he had better prepare a second quantity of developing solution, precisely the same as at first, and having poured off the discoloured and dirty solution from the plate, pour on that freshly made. Great intensity may by this means be obtained without the danger of the clouding over of the light parts by the deposition of silver in the metallic state.

THE FIXING PROCESS.

Having poured off the developing solution, the plate is to be washed in a gentle stream of water, and being replaced on the levelling stand, a quantity of hypo-sulphite of soda (page 17) is to be poured over it, and allowed to remain on until the whole of the yellow iodide of the parts unacted upon by light is entirely dissolved. When this effect, which is readily perceived, is brought about, the plate must be washed in abundance of water, poured very gently over it. Care is required in this operation to prevent the film from being broken, and also from being washed off. The former mishap may be prevented by pouring the water over the plate from a very small elevation, and the latter by not allowing the stream to play on any part of the film that is not attached to the extreme edges of the glass plate.

VARNISHING THE PLATE WITH SPIRIT VARNISH.

Before we can print with safety from the negatives obtained by the collodion process, it is necessary to protect the film from injury, and at the same time to take care that the varnish that we use possesses the qualities of transparency and hardness. The varnish I employ is composed of gums dissolved in alcohol, and the best mode of applying it is to warm the plate gently by the fire to prevent it from becoming chilled; then pour on the varnish in the same manner as recommended while treating of the collodion film, returning the superfluous quantity to the bottle. A fragment of blotting paper is to be passed along the edge of the glass where the varnish has become thickened, in order to remove the same. On holding the varnished side of the plate to the fire for two or three minutes, the varnish will become quite dry, and when cold will be perfectly hard.

The precautions necessary in the varnishing process are, first, not to make the plate too hot before coating it with varnish, as this causes it to crack at some subsequent period; second, not to allow the plate to get cool before the varnish is quite dry, otherwise, instead of a beautifully hard transparent film, we shall have one nearly opaque and of a granular appearance, owing to the varnish having become chilled. If the varnishing operation has been skilfully conducted, there is a great difficulty in determining on which side of the glass the picture has been formed, without referring to the corner by which the plate has been held.

VARNISHING THE PLATE WITH BENZOIN VARNISH.

Although the above plan answers perfectly, it is not always convenient to have a fire at hand in order to warm the plate; we have therefore devised another varnish, called Benzoin Varnish, in which the solvent is chloroform, which does not require the plate to be warmed. This varnish is applied to the plate in the same manner as collodion, and the superfluous quantity being returned to the bottle, the plate is dry in a few seconds; the film being protected by a beautiful hard film of varnish.

We cannot overrate the value of this preparation, for, from the ease with which it is applied, and the certainty of a successful result, it is invaluable in the hands of the amateur.

POSITIVE COLLODION PROCESS.

The Positive Collodion Process having since our last Edition become so exceedingly popular, from the ease and readiness with which the finished pictures are obtained, we purpose to devote a separate article to the consideration of the details of the process.

IODIZING SOLUTION FOR POSITIVE COLLODION.

The iodizing solution that has succeeded best in the hands of the Author, and one that gives most excellent results with the collodion prepared as before described (page 14), is composed in the manner following:—64 grains of iodide of potassium are to be dissolved in 4 ounces of alcohol, of the specific gravity ·840, to this is to be added 1½ grains of resublimed iodine; when dissolved and filtered, 2 drachms of this iodizing compound are to be added to 6 drachms of collodion, prepared as before indicated. When the collodion thus iodized has become quite clear, it is ready for use.

SOLUTIONS REQUIRED IN THE POSITIVE COLLODION PROCESS.

THE BATH.—The bath for rendering the plates sensitive is very simple in its nature, being composed of—

Nitrate of silver, in crystals . .	1½ ounces.
Distilled water	20 ounces.

When the crystals are dissolved, a drop of the solution is to be allowed to fall on a fragment of blue litmus paper, and its effect carefully noted; if it fail to change the colour to a full pink verging on red, we may conclude that the bath is not in a sufficiently acid condition to produce clear and brilliant pictures. In order to bring about this result, it is necessary to add a few drops of nitric acid which has been diluted with four times its bulk of distilled water, and testing with the paper between each addition, until the desired tint is obtained.

On the contrary, should the bath exhibit a decidedly acid reaction, that is, should it turn the litmus paper immediately of a decidedly red colour, we must add ammonia, drop by drop, until the acid becomes sufficiently neutralized to give the indication required for a good bath.

Great care is required in these manipulations not to overdo the quantity of either acid or ammonia; in either case, the bath would be rendered useless unless the excess were removed. To recapitulate, we may remark that a good positive collodion bath ought to have a very perceptibly acid reaction on litmus paper.

DEVELOPING SOLUTION FOR POSITIVES.

There have been almost as many solutions proposed for the purpose of developing the positive collodion picture as there are operators; the chief difference, however, will be found to consist in the proportions of ingredients rather than in a great diversity of substances. I have experimented on all known solutions, and can obtain good pictures with many of them, but I have been led to the adoption of the following formula, from its extreme simplicity and the ease with which it is prepared, and the beautiful and exquisite tones it gives to the picture.

The solution is composed as follows:—

Proto-sulphate of iron . . .	40 grains.
Distilled water	2 ounces.
Nitric acid	1 drop.
Alcohol	1 drachm.

The proto-sulphate of iron is to be dissolved in the water, the nitric acid is then to be dropped in, and, lastly, the alcohol is to be added: if the solution is at all turbid, it must be filtered before use.

FIXING SOLUTION FOR POSITIVES.

The fixing solution for positives is composed according to the following formula:

Cyanide of potassium . . .	20 grains.
Distilled water	10 ounces.

When dissolved, filter carefully for use.

The positive collodion process divides itself naturally into seven distinct steps, namely, cleaning the plate, coating the plate with collodion, exciting or rendering the plate sensitive, exposure in the camera, development of the latent image, fixing the picture and, lastly, varnishing and backing the picture.

Before entering on the details of this beautiful process, let me remind the beginner, that in order to insure success, he must be scrupulously clean in all his manipulations,—the cloths he uses for cleaning the plates must be absolutely free from impurity, and every care must also be taken to prevent the access of white light to the surface of the plate after it has been rendered sensitive.

Bearing these remarks in mind, he may proceed to

CLEANING THE PLATE.

In the positive process, the plate requires to be free from the slightest impurity,—it is not only necessary that it should appear clean, but it must be chemically so; the plan most to be recommended is to lay the plate on a piece of white blotting paper, and pour on it a few drops of a mixture of 2 drachms of powdered tripoli in 1 ounce alcohol. This is to be rubbed over the plate on both sides with a small pledget of cotton wool, using a brisk circular motion of the hand; this will remove all extraneous matters, and the plate is to be then well washed under a stream of water, and immediately dried on a linen cloth, and finished with a perfectly clean wash leather. The plate being now clean, and perfectly free from every impurity, we proceed to the next operation—

COATING THE PLATE.

This is accomplished in precisely the same way as in the negative process, (a detailed description of the manipulation will be found at page 18); the same precautions are necessary in both processes, the object being to spread the film in a perfectly even manner over the glass plate.

RENDERING THE PLATE SENSITIVE

Forms the next step in the process. When the collodion film has become set, the plate is to be placed on the glass dipper, and plunged, without hesitation, into the nitrate of silver bath; after a lapse of not less than half a minute, the dipper with the plate is *to be withdrawn*, and immediately returned to the bath. During the interval that the coated surface remains out of the bath in this operation, we shall observe that the film has become of an opalescent hue, and that the surface of it exhibits innumerable streaks running down from the top to the lower edge of the plate; these streaks are caused by the æther remaining in the film, and must be removed by moving the plate briskly up and down through an interval not exceeding two minutes. On examining the state of the surface at this stage of the proceeding, we shall find that the liquid composing the bath flows quite freely and evenly over it. The plate is now ready to be placed in the dark slide of the camera to await

THE EXPOSURE IN THE CAMERA.

This is a point of the greatest nicety in the whole process,—as so much of the beauty of the picture depends on the correct amount of exposure being given to the plate, and, unfortunately, the Author is not in a position to give any definite directions on this head, owing to the varying circumstances under which a picture may be taken; he is therefore compelled to have recourse to the same mode of instructing the judgment of the operator as he adopted while treating of the negative process, namely, by giving instances of over-exposure and under-exposure. In a plate when subjected to the action of the developing agent, that has not undergone the proper amount of exposure, the following peculiarities will manifest themselves:—the parts of the object which have been most highly illumined will, after a moment or so, make their appearance, and then, after a considerable lapse of time, we shall perceive the parts slightly less illumined coming out, but no matter how long we continue the development, we shall fail altogether to distinguish a trace of the deeper shadows of the picture.

On the contrary, in the case of a plate that has been over-exposed, a very different set of phenomena will present themselves. Immediately on applying the developing solution, the whole of the picture will make its appearance at once, the deep shadows coming out as soon as the high lights—these assuming undue prominence

—and, further, after treatment with the cyanide of potassium, and subsequent washing with water, there will be an absence of half-tone in the light portions of the picture; and in the instance of a portrait, the face will appear almost flat, the features scarcely being distinguishable, owing to the blending of the lights of the picture with the shadows: the reason is obvious,—the shadows which ordinarily possess but little depth have been exposed to too long an action, and have become nearly as forcible as the high lights, which in their turn are incapable of attaining any greater brilliancy, no matter how long exposed to the solar radiations, consequently, we lose the contrast, and obtain only a flat map instead of a perfect portrait.

The picture which will follow the application of the developing agent, if the operator has been happy in the judgment of his time, will present none of those peculiarities above mentioned, but, on the contrary, the high lights, as a matter of course, will be the first to appear; then the half-tones, visibly inferior in strength; and, lastly, the shadowy parts will be faintly visible.

From these observations, the operator will doubtless, after a little practice, be enabled to judge of the time of exposure with sufficient accuracy to ensure good results.

We must imagine that the plate has undergone the exposure in the camera, and awaits the next stage of the process, the

DEVELOPMENT OF THE LATENT IMAGE.

The plate, on removal from the dark slide of the camera, is to be placed on the levelling stand (page 22), the screws of which have been so adjusted that the plate may have an extremely slight inclination from right to left; the position of the plate is represented by this line (A B)

Then having placed the developing solution in a measure glass, it is to be carefully poured along the upper edge of the plate, namely, at (A), as quickly as possible, the inclination of the plate will cause the liquid to diffuse itself all over the plate in a continuous stream, and will prevent the formation of stains and streaks, which would be likely to occur if the developing solution were applied in the way described for negatives (page 23).

When the developing agent has completely covered the plate, the picture will begin to make its appearance, the high lights coming out almost immediately; then the half-tones; and, lastly, the parts that were in deep shadow will give indications of their presence. When this point is reached, the solution must be thrown off the plate, and an abundant supply of water run over its surface, in order to prevent the decomposition of the cyanide of potassium, which would take place from the action of the acid in the developing solution, when

FIXING THE PICTURE.

When the plate is quite free from the developing fluid, it is returned to the levelling stand, and the solution of cyanide of potassium is applied so as effectually to cover the surface; this is for the purpose of dissolving the iodide of silver which forms the sensitive surface.

It is most beautiful and interesting to notice the mist, as it were, gradually being dispelled by the cyanide, and the brilliant picture stand out in bold relief against the back ground: photographically speaking, I know of no greater pleasure than to see a successful picture gradually making its appearance from the clouds that have enveloped it up to this point; it well repays you for many failures and vexations in the earlier part of your photographic career.

When the picture is quite free from the iodide of silver, it is to be washed in a gentle stream of water, and allowed to dry, to await the next stage in the process—

VARNISHING AND BACKING THE PICTURE.

For positives, the surface of the collodion must be varnished precisely in the same manner as directed while treating of negatives (page 24), although, in this instance, the benzoin varnish is to be preferred to the spirit varnish, as there is less liability to accident in its use.

When the varnish is quite dry, the plate is to be warmed, and a black varnish, called LIQUID JET, is to be poured over it, observing the same precautions as with the transparent varnish; the only difference in the manipulation being, that the plate that has been coated with black varnish must be placed in the neighbourhood of a fire—for instance, on the hob—for about a quarter of an hour, in order that the varnish may get perfectly dry before it is handled.

The reason for varnishing the positive proof with the transparent varnish before treating it with the liquid jet, is to preserve the lights in all their integrity; neglect of this precaution not unfrequently leads to great disappointment and vexation, without the possibility of a remedy.

For the production of positive pictures on paper, we refer the reader to the section devoted to that subject (page 61).

FAILURES AND THEIR CAUSES.

UNDER this head, I purpose to enumerate the principal instances of failure in the Collodion processes, both Positive and Negative, and to endeavour to point out the cause of each, with a view to its correction, and I have no doubt but the beginner in Photography will be glad to have an article like the present to assist him in discovering the cause, and indicating a remedy in any case of failure that may occur in his own practice.

In order to make the subject more clear, and to enable the operator to refer the failure he may have met with to its proper cause, I have considered it best to divide the failures into classes, namely, those dependent on the condition of the collodion,—those having relation to the state of the nitrate of silver bath,—those from improper exposure in the camera,—and, lastly, those from peculiarities in the developing solutions.

To secure perfect clearness, however, it is necessary to consider *separately* the conditions under which negatives and positives on *glass are* produced.

THE NEGATIVE PROCESS.

FAILURES ATTRIBUTABLE TO THE CONDITION OF THE COLLODION.

The collodion, when in good condition, ought to be quite clear, or, at least, free from any floating particles of insoluble matter,—if this be not the case, when it is poured on the plate, the insoluble portions will become fixed to the surface, and the fluid collodion, passing round them in its passage back to the bottle, will produce irregular patches in the surface: these can be clearly seen when the plate comes from the bath, and a plate so defaced ought not to be used, as it is sure to be developed with a stain or mark, indicating the position of the insoluble matter let fall from the collodion.

The remedy in this case is obvious, for by allowing the collodion to remain at rest for some hours, all insoluble matters will fall to the bottom of the bottle, and the clear portions can be decanted into a clean dry bottle for use.

Diagonal Streaks across the Plate are caused by the collodion being too thick, and not flowing quite freely over the plate; this occurs from the evaporation of the æther, either from the high temperature of the atmosphere, as in summer, or from the sample under consideration having been used for covering a great number of plates; in either case, the remedy is the same, namely, to add sufficient sulphuric æther of the specific gravity ·745, to bring back the collodion to a condition in which it will flow evenly over the plate; the æther should be added a little at a time, and a plate spread between each addition, as a test for the quantity required.

Absence of Half-tone in the picture is caused by the iodized collodion with which it is taken having undergone a slight decomposition from keeping, which renders it very slow in its action, and insensible to weak luminous radiations, such as emanate from the shadows of a picture: the cause is not as has often been erroneously stated—the liberation of free iodine (causing the collodion to appear red)—but is owing to a decomposition that has taken place in the collodion itself when mixed with the iodizing solution, the quantity of alcohol present in the collodion determining the amount of decomposition.

FAILURES ATTRIBUTABLE TO THE STATE OF THE NITRATE OF SILVER BATH.

Of all the misfortunes that can possibly befal the collodion operator, perhaps there is none which gives so much trouble as the fogging of the pictures; probably this arises from an imperfect knowledge of the causes that bring about this state of the plate, but in all cases it may be referred to the state of the bath. For negatives, the bath ought to be in a slightly acid condition, and exactly saturated with iodide of silver; when these conditions are obtained, the bath will yield clean and perfect pictures on development; but if, from any cause, the bath should have become alkaline,—that is to say, when tested with litmus paper, fails to give an acid or neutral indication,—then the plates will all become fogged under the action of the developing solution. This fogging may be explained as a clouding over the parts of the picture that ought to be transparent, and when positives are printed from fogged negatives, a great want of contrast is always observable in them. The immediate cause of this veil or cloud over the picture is the decomposition of the iodide of silver by the developing solution, independently of the action of light; and tracing the matter to its source, we find that the real cause of the fogging is, that the iodide of silver precipitated from an alkaline bath is decomposed by the developer, while that precipitated on a plate in the presence of an acid—that is, in an acid bath—is entirely unacted upon by it: thus we have explained at once the cause of this most troublesome failure. The remedy is simple in the extreme,—we have only to add, drop by drop, the best and purest glacial acetic acid, until the litmus paper indicates a slightly acid reaction, as described at page 16.

But, independently of the above causes of fogging, there is another, which, until its remedy is known, is apt to give great annoyance; it is the fogging that comes on mostly in very warm weather, more especially if the bath has been allowed to evaporate; it is fogging by super-saturation of the bath with iodide of silver: under these circumstances the bath may be perfectly clear and indicate an acid re-action, and yet the pictures are all fogged, and this is to be attributed to an excess of iodide of silver in the bath.

The remedy in this case is to add to the bath about a sixth part of its volume of distilled water, this will cause a milkiness in the solution from a precipitation of iodide of silver; pass the bath in this state through a filter, and add to the clear solution as much nitrate of silver in crystals as would be sufficient to make it of the proper strength, namely, 30 grains to the ounce; thus if we add 4 oz. of water in the first instance, we shall have to throw into the clear filtered bath ¼ oz. of nitrate of silver. If we now take a picture on a plate prepared in this bath we shall find it quite free from fog or cloudiness.

STREAKS DOWN THE PLATE.—After the immersion of a number of plates in a nitrate of silver bath, we shall find, on testing it, that it contains a considerable amount of æther, which it has acquired from the successive films on their immersion; now when this æther exists in the bath beyond a certain proportion it gives rise to streaks on the plate, for it is impossible to get the solution to flow freely over the surfaces of the plate in a bath in which there is an excess of æther.

The remedy in this case is either to allow the bath to be exposed to the air for some time, or what is better, to place the bottle into which it has been turned in a vessel of hot water for half an hour or so, this will cause the æther to evaporate and the bath will be restored to its former condition.

DUST ON THE SURFACE OF THE BATH will give rise to a number of blemishes on the plates, the kind varying with the nature of the deposit; if the bath has been allowed to be exposed to the air and light for some days the surface will be covered with a thin layer of pure silver, this will cause stains over the plate immersed in a bath so circumstanced, but the most frequent difficulty met with arises from the dust of the room settling on the surface; if a plate be immersed when the surface of the bath is covered with dust, it will be found that, as it descends into it, the particles attach themselves to the surface of the film and are carried down with the plate; these do not wash off, but adhere firmly, and, on developing a picture taken on a plate prepared in this way, we shall have a series of lines composed of black spots running from the bottom of the plate to the top, in fact following the direction of the immersion in the bath. This difficulty is obviated by filtering the bath, or by carefully drawing over its surface a piece of perfectly clean bibulous paper; this will remove the particles of dust and the cause of failure at the same time.

Slow Action of Light on the Film.—It sometimes happens that after working with a collodion that we know to be sensitive we cannot obtain a picture under a very lengthened exposure, and then the high lights predominate to an undue extent; the cause of this will be found in the bath being in a condition of too great acidity, the litmus paper when dipped into it will turn immediately of a full red colour. The remedy under these circumstances is to add ammonia drop by drop until the overcharge of acid is corrected, which may be ascertained first by the test paper, but more correctly by taking a good picture having its half-tones perfect with a short exposure to light.

FAILURES ARISING FROM IMPROPER EXPOSURE IN THE CAMERA.

Failures that arise from this cause are not numerous—the principal ones, namely, over-exposure and under-exposure, are fully detailed while treating of the negative process, (page 22). There is one however, which may occur sometimes, more especially while taking views, namely, that of the formation of a film or mist before the picture; this is caused by the action of the diffused light in the camera on the surface of the film, and is quite a distinct kind of fog from that produced by the alkalinity of the bath. The remedy is to place a smaller stop in front of the lens, in order to shut out as much extraneous light as possible.

FAILURES DEPENDENT ON THE DEVELOPING SOLUTION.

The developing solution being very readily decomposed, ought to be mixed fresh and fresh, otherwise it is apt to lose its power of reducing the iodide of silver that has been acted upon by the light, and this will be found the cause of pictures which, from all other circumstances ought to be good and vigorous, coming out a dull colour, and which do not admit of being strengthened by the addition of nitrate of silver.

As soon as the developing solution becomes discoloured it ought to be rejected, for when the nitrate of silver is added to it and thrown on the plate it immediately decomposes the nitrate of silver on the surface, and gives rise to a sandy deposit of silver which it is impossible to remove by subsequent washing. Another test as to when this effect is coming on is, that the solution on the plate when blown upon as directed (page 23), exhibits patches of a silky lustre, owing to the reduction of the silver to a metallic state.

Specks over the Plate.—These are caused by particles of metagallic acid which is sometimes present in a sample of pyrogallic acid, this impurity is removed by filtration through bibulous paper.

THE POSITIVE PROCESS.

FAILURES ATTRIBUTABLE TO THE CONDITION OF THE COLLODION.

The Collodion used for taking positive pictures ought not to be too freshly iodized, otherwise the pictures will be dirty, and not possess that clearness of outline that distinguishes a good positive.

Comets and specks of all kinds are caused by insoluble particles floating in the collodion, and which become deposited on the plate as the collodion is poured on. The recurrence of these may be prevented by allowing the bottle containing the collodion to remain at rest for some time, and then decanting the clear fluid into a perfectly clean bottle. A tall bottle, like that at *Fig.* 8, is very useful for this purpose.

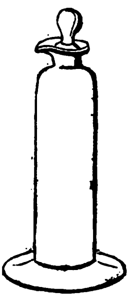


Fig. 8.

DIAGONAL LINES OR RIDGES ACROSS THE PLATE are caused by the collodion becoming too thick, either from the high temperature of the atmosphere, or from having been used for too many plates. The remedy, in this case, is to add sufficient pure sulphuric æther, of the specific gravity ·745, to reduce the collodion to the proper consistency,—the test being when it flows evenly over the plate without ridges or lines being formed as the film dries.

FAILURES ATTRIBUTABLE TO THE CONDITION OF THE NITRATE OF SILVER BATH.

The bath for positives ought to possess a decidedly acid reaction,—that is, a drop of it let fall on blue litmus paper should turn it immediately to a light red colour.

The bath, also, must be carefully filtered from time to time, and ought to be quite clear and bright before being used.

The greatest difficulty the operator, in the positive collodion process, has to contend with, is the fogging of his pictures,—that is, the formation of a veil or mist over the details of the picture, which effectually obscures them. The causes of this fogging are two-fold, each depending on a certain condition of the bath: thus we have fogging produced by the bath assuming an alkaline condition, which may be detected by litmus paper which has been slightly reddened by acetic acid, changing to its original blue colour after being moistened with the bath. The remedy for this evil is the addition, drop by drop, of diluted nitric acid, until *the acid* reaction of the bath is again established.

The other cause of fogging is the bath becoming saturated with iodide of silver; this, more especially, shows itself in hot weather, or after the bath has been exposed to the air for some time. The bath becomes saturated by dissolving a portion of the freshly-formed iodide of silver from each plate during its sojourn in the liquid. The remedy, under these circumstances, is to add to the bath about a sixth part of its volume of distilled water; this will cause a deposit of the iodide of silver. The turbid solution thus formed is then to be filtered, and sufficient quantity of nitrate of silver, in crystals, is to be added to the clear solution, to make the bath up to its original strength, namely, 30 grains to the ounce.

Want of Half-tone in positives on glass is due to an over-dose of acid in the bath,—its mode of action is to retard the action of the light, so that the faintly illuminated parts of the object make little or no impression on the prepared plate. The addition of ammonia, drop by drop, is the remedy in this case; a plate should be tried between each addition until the required degree of neutralization is reached.

FAILURES DEPENDENT ON IMPROPER EXPOSURE IN THE CAMERA.

The failures from this cause are not numerous, and consist of under-exposed, over-exposed, and fogged plates. The peculiar points that distinguish a plate that has been under-exposed are fully discussed at page 29, as likewise those that distinguish a plate that has been exposed to the luminous influence for too long a time.

The fogging is produced by the action of the diffused light in the camera on the surface of the iodide of silver, it is quite a distinct and different kind of mist that is deposited from this cause from that produced when the bath is alkaline. The fog from diffused light, although it obscures the picture to a great extent, does not seem so thoroughly imbedded in the film as that produced from an alkaline bath, for in some instances the whole of it may be removed by gentle friction with a piece of soft cotton wool, clearly proving that its deposition is not due to any peculiarity of the iodide of silver of the sensitive film, but is merely the result of the superficial action of a feeble diffused light.

FAILURES THAT DEPEND ON THE DEVELOPING SOLUTION.

Stains on the picture, irregular stains on the back-ground or other parts of the positive picture, are mostly caused by the developing solution not being sufficiently strong, which causes it to decompose the iodide of silver of the film in an irregular manner.

Silvery appearance in the high lights is caused by an excess of nitric acid being present in the developing solution: the remedy is obvious.

Too rapid a development of the picture is caused by the developing solution being too strong, so that when we find that the picture comes out the instant the solution is applied we may argue that there is too much of the proto-sulphate of iron in the mixture and must dilute it accordingly in order to obtain good pictures.

We have now enumerated the principal failures that may arise in the path of the inexperienced, and although they may appear to be very formidable, I should assure my readers that they do not necessarily occur; and if the directions that I have given while treating of the process be implicitly followed, I see no reason why any of them should obstruct the way to perfect success. However, such accidents and failures do arise, and my wish is therefore to point out their causes and to provide a remedy in each individual case.

THE ALBUMEN PROCESS.

APPARATUS REQUIRED FOR THE ALBUMEN PROCESS.

- Pneumatic plate-holder.
- Whisk, for frothing the albumen.
- Funnel, large size.
- Levelling stand.
- Porcelain pan.
- Drying box.
- 1 ounce measure.
- Minim ditto.

SOLUTIONS REQUIRED FOR THE ALBUMEN PROCESS.

Iodide of ammonium . . .	160 grains.
Distilled water	1 ounce.

Nitrate of silver	50 grains.
Distilled water	1 ounce.
Glacial acetic acid	2 drachms.

Gallic acid	30 grains.
Water	8 ounces.

Hypo-sulphite of soda . . .	8 ounces.
Water	20 ounces.

THE ALBUMEN PROCESS ON GLASS PLATES.

The only advantage in the use of albumen as a vehicle for the sensitive compounds, is that we are enabled by its adoption to use the plates in the dry state, which renders the process particularly applicable for views and such subjects as are removed from any convenient position for manipulation. The plates prepared by this process are not very sensitive, requiring a long exposure in the camera; and further, there is some little difficulty in obtaining the dark parts of sufficient intensity to make satisfactory positives.

The process of obtaining a picture on albumenized glass, divides itself into the following operations:—

The preparation of the albumen.
Spreading the same on the surface of the glass.
Drying the film.
Rendering the film sensitive to light.
Exposure in the camera.
Developing the latent image, and
Fixing the picture when formed.

The various plans that have been proposed for the preparation of the albumenized plate are so very similar, that it matters very little which formula is followed; the subjoined, however, will be found to fulfil all the conditions necessary to obtain a perfect picture.

PREPARATION OF THE ALBUMEN.

Throw the whites of three or four new-laid eggs into a deep dish, and having carefully removed any opaque portions, beat them together, with a whisk or a wooden fork, for two or three minutes, just to break up the structure of the mass; then add 1 drachm of a solution of iodide of ammonium (of the strength of 160 grains of the salt to 1 oz. of water) for each white of egg, and thoroughly beat up together until the whole is converted into a perfectly white froth; cast this into a funnel, in which has been previously placed a double fold of fine muslin, and covering it over to protect it from dust, allow it to remain at rest for 10 or 12 hours, at the end of which time the froth will have subsided, and have drained as a clear liquid into the bottle placed under the funnel to receive it.

SPREADING THE ALBUMEN ON THE GLASS PLATE.

This is best accomplished, after having first rendered the plate perfectly clean, by rubbing it with a mixture of tripoli and alcohol, and then thoroughly washing and drying it, by fixing the pneumatic plate-holder (*Fig.* 9) to the centre of the back of the plate; then holding the plate in the left hand in a horizontal position, pour on sufficient iodized albumen to cover it—the flow of the albumen may be directed with the aid of a glass rod, the superfluous quantity being returned to the bottle in the same manner as if we were working with collodion. Return the plate now to the horizontal position, and if there should appear any irregularity in the film, a gentle rotary motion may be given to it —this will cause the albumen to diffuse itself evenly over the plate: when this is the case, the plate-holder may be disengaged, and the albumenized plate placed carefully in the groove in the drying-box destined to receive it, where it must remain for a few hours in order to become dry and suited for the next operation—

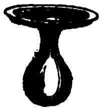


Fig. 9.

RENDERING THE PLATE SENSITIVE.

The following formula will be found to give the best results:—

Nitrate of silver . .	50 grains	Aceto-nitrate of silver.
Glacial acetic acid .	2 drachms	
Distilled water . .	1 ounce	

The operation of rendering the plate sensitive is performed by pouring some of the above solution into a shallow glass dish, to the depth of ¼ of an inch, and then placing quickly the prepared side of the plate in contact with it. This is best effected by resting one end of the plate quite in the bottom corner of one side of the dish, and then dexterously allowing it quickly to drop down on to the fluid, taking care that no air bubbles intervene. The plate should be allowed to rest in this position for the space of two minutes, when it is to be carefully raised, and removed to a dish of distilled water, there to be agitated for two or three minutes; it may now be stood on end in a warm place to dry, or be placed immediately in the dark frame, to await the exposure in the camera.

EXPOSURE IN THE CAMERA.

In this matter, experience is the only guide that can be depended upon; all that we can offer to the reader, is what experiment has shown to be the limits of time between which the plate, as prepared above, may be submitted to the solar radiations with success. The exact time of exposure must depend on the nature of the object, the position of the sun, and the temperature of the air. In a good light, with a temperature of 60°, from 5 to 6 minutes will be quite sufficient, where the view is of a moderately light colour, such as a stone building, *cathedral*, &c. &c.; but if a landscape be the object we desire, then a much longer time—say, from 20 minutes to 30 minutes—will not overdo the picture. A very few trials will, however, do more in forming the judgment of the operator in this particular than pages of directions, which can only be framed from cases that may only have occurred to the author.

DEVELOPING THE LATENT IMAGE.

On removing the plate from the camera, it is to be placed on a levelling stand, such as recommended for the Collodion process (page 22), and treated with the solution of gallic acid,—the picture will soon make its appearance, if it has had the right exposure. When the image is quite developed, but of rather a faint colour, a small quantity of gallic acid and aceto-nitrate of silver, in equal proportions, is to be poured evenly over it,—this will deepen the tones and give force and vigour to the whole picture; when this point is attained; and the impression is sufficiently dark, the developing solution is to be thrown off, and a quantity of water poured over the surface, to fit it for the process of

FIXING THE PICTURE,

Which consists in pouring on to the plate the solution of hyposulphite of soda, and leaving it there till all the yellow colour *disappears*—washing the picture thus fixed with abundance of water, and subsequent drying of the plate, concludes the process of obtaining a negative on glass by means of a film of albumen.

These negatives may be printed from without being varnished, if a little care be taken that their surfaces are not allowed to come in contact with any grit, so that they become scratched. The exquisite detail of Albumen pictures forms one very great recommendation for the adoption of the process. Another advantage is, that the plates can be used in the dry state, and after being excited for several days. The only drawback appears to be, the length of exposure in the camera, and the tardy development of the photographic image, after having been subjected to the solar influence.

PAPER PROCESSES.

THE CALOTYPE OR TALBOTYPE.

The process—a modification of which we are now about to describe—was the subject of a patent granted to Mr. Fox Talbot, from whose name the second title of this paper is derived. It consists essentially of the production of pictures on iodized paper, by means of nitrate of silver and gallic acid. It is impossible, however, to obtain a successful picture by Mr. Fox Talbot's method as laid down in his specification, and it has been found necessary so to modify the plan of procedure, that it almost assumes the form of a new process.

The material on which we have to work is paper, and every care and attention ought to be directed to the selection of such samples as present the greatest uniformity of texture and evenness of surface, combined with transparency, and freedom from gross blemishes—such as iron or brass spots, &c.

APPARATUS REQUIRED IN THE CALOTYPE PROCESS.

- Soft wood board.
- Glass rod.
- Funnel.
- 1 oz. measure.
- Minim ditto.
- Pins.

SOLUTIONS REQUIRED IN THE CALOTYPE PROCESS.

FIRST PROCESS.

Iodide of silver	30 grains.
Water (distilled)	1 ounce.

Iodide of potassium, to dissolve iodide of silver.

Nitrate of silver	50 grains.
Water (distilled)	1 ounce.

Glacial acetic acid.

Gallic acid	4 grains.
Water (distilled)	1 ounce.

Hypo-sulphite of soda	4 ounces.
Water	1 pint.

SECOND PROCESS.

Iodide of potassium	20 grains.
Water (distilled)	1 ounce.

Nitrate of silver	30 grains.
Water (distilled)	1 ounce.
Glacial acetic acid	2 drachms.

Gallic acid	4 grains.
Water (distilled)	1 ounce.

Hypo-sulphite of soda	4 ounces.
Water	1 pint.

There are two processes by which the author has succeeded in obtaining most excellent results, and he now purposes to give such plain and simple directions in both of them, that if followed, carefully and in detail, by the merest tyro in the art, must lead him to success.

The first process separates itself into the following divisions:—

Iodizing the paper.
Rendering the paper sensitive.
Exposure in the camera.
Development of the image; and
Fixing the picture.

TO IODIZE THE PAPER.

Make a solution as follows—

Nitrate of silver	30 grains.
Distilled water	1 ounce.

Add to this a solution of 30 grains of iodide of potassium in 1 ounce of water: a brilliant yellow precipitate will be the result. Allow this to settle, pour off the supernatant liquid, and treat the precipitate with a fresh 2 ounces of distilled water; let it rest once more, and again decant the clear liquid remaining above the powder. Now pour 1 ounce of distilled water on to the iodide of silver thus formed, and add one crystal at a time of iodide of potassium (continually stirring with a glass rod) until the whole of the precipitate is dissolved; the liquid may now be filtered through blotting paper, and preserved in a well-stoppered bottle for use. This solution is technically called "Double iodide of silver."

The paper best suited for the Calotype is that manufactured by "Turner, of Chafford Mill," or that by "Whatman, of Turkey Mill." Either of them allow of good pictures being produced on them.

Having selected a sheet of paper, as free as possible from blemishes of any kind, pin it by two of its corners to a soft wood board (*a*, *Fig.* 10), and laying it flat on a table, place a glass rod along its upper end, next the pins that retain the paper, holding it with the right hand; then with the left hand pour some of the double iodide of silver immediately in front of

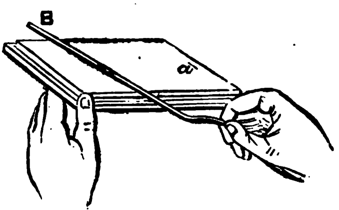


Fig. 10.

the glass rod (B), and move the same down the sheet of paper in such a manner that the liquid may follow the rod, and give an even coating. If this be not accomplished the first time the rod is passed over the surface, a repetition of the movement will generally secure this end. Care must be taken not to press too much on the rod, otherwise the surface of the paper is liable to become injured.

The paper being thus coated with an even layer of "Double iodide of silver," is to be removed from the board, and hung up to any convenient support, to become *surface dry*. It is then to be placed very carefully, prepared side downwards, on to the surface of water contained in a porcelain pan, and allowed to remain in contact with it for ten minutes. It is then to be removed to another pan of water, and to be totally immersed in it for the space of ten minutes more; and, finally, it is plunged into a large pan of water, and there soaked for thirty minutes, from which it is cautiously taken out, and hung up to dry spontaneously.

Care is required in floating the paper on the first bath, in order to prevent the intervention of air-bubbles between the surfaces of the water and paper. The best way of obviating this difficulty is, to take the sheet of paper, one end in the right and the other in the left hand, and bending it into the shape of the letter U with the coated side outwards, place the middle of the letter in contact with the water, and gradually lower the ends of the paper on to the surface of that fluid. The paper being quite dry, will present a beautiful primrose tint, and is ready for the next operation, which is

RENDERING THE PAPER SENSITIVE.

The solutions required for this purpose are the following:—

Nitrate of silver	50 grains.
Distilled water	1 ounce.

Gallic acid	4 grains.
Distilled water	1 ounce.

Glacial acetic acid.

And the sensitive solution applied to the iodized paper prepared as above, is a mixture of these in the proportions indicated below:—

Distilled water . .	1 drachm	Gallo-nitrate of silver.
Nitrate of silver solution	4 drops	
Solution of gallic acid .	3 drops	
Acetic acid . . .	3 drops	

Thoroughly mix.

This solution is to be applied to the iodized paper in the same manner as the double iodide, as before described, namely, by means of the glass rod. After it has been allowed to remain on the paper for two minutes, the superfluous quantity is to be carefully removed by means of *perfectly clean* bibulous paper, and the paper, if not required to be used immediately, can be hung up to dry in a dark place. Paper prepared in this manner will keep good for 24 hours; that is to say, it may be prepared in the evening of one day, and the picture be developed in the evening of the next, without any detriment to its perfection.

We now proceed to the

EXPOSURE IN THE CAMERA.

This part of the process requires attention, and it is only by observation and experience that we can determine the time required under different circumstances. On a moderately bright day, with an average landscape, the time of exposure would vary from five minutes to ten; the exact amount depending on the nature of the objects, and their degree of illumination. In very dull weather, from 15 to 20 minutes may with advantage elapse between opening and closing the lens—but even with this long exposure, pictures are never so satisfactory as when taken on a bright sunny day.

BRINGING OUT THE PICTURE.

The paper when it comes from the dark frame of the camera presents usually an uniform surface, no trace of the picture being visible. It is again pinned to the soft wood board, and by means of the glass rod the solution of gallic acid is spread over it, taking care that the whole of the paper is equally wetted.

After a few minutes the latent image will begin to unfold itself in a most remarkable and beautiful manner—the sky, as might be supposed, coming out first—then the most highly illumined portions of the picture—and, lastly, the deep shady parts make their appearance. While this is taking place, the rod must frequently be passed over the paper, to equalize the action of the gallic acid, and also to prevent any part of the paper from becoming dry. When all the picture is developed, but is still of a light colour, a few drops of gallo-nitrate of silver may be added, and quickly spread over the paper; this will have the effect of deepening the tone of the impression, and of giving due preponderance and intensity to the dark parts of the negative.

Judgment must be exercised so as not to carry the development too far, otherwise the light parts of the picture suffer, and become charged with a deposit of oxide of silver, which greatly affects the beauty of the positive impression taken from it in the subsequent part of the process. The degree of development may be ascertained by carefully lifting the picture by one corner, and interposing it between the eye and the light; it will be seen by this means whether the "blacks" of the impression are sufficiently decided and vigorous, and also whether the detail possesses sufficient intensity to give its due effect in the positive.

As there is great latitude in the amount of time we have indicated for the exposure of the paper to the action of light, it may be perhaps of some service to the novice to point out the effects of "under and over-exposure." If the paper, on the one hand, has been too short a time under the influence of the light, it will be some considerable time before any appearance of an image will manifest itself when being treated with gallic acid, and the shadowy parts will with great difficulty come out, even if they do at all; but, on the other hand, if too long an exposure has been given, the picture will be visible on the paper before the application of the gallic acid, and on being subjected to the process of development as before described, will assume a red tinge, instead of the beautiful and intense black, so characteristic of a negative that has undergone the correct time of exposure.

This mode of operating presents many advantages over the former, the principal of which are simplicity, ease in the management, absence of necessity for so much washing of the paper, &c.

Before proceeding to describe the exact plan of manipulation, I purpose to indicate what I consider the principles that ought to guide us in the production of a sensitive Calotype paper.

If we precipitate an iodide of silver from a solution of the nitrate, with an excess of iodide of potassium, we obtain a beautiful primrose powder, which, on exposure to light, does not show the slightest alteration in its properties,—clearly indicating that this particular compound of iodine and silver is insensible to the influence of solar radiations.

But if, in a second experiment, we cause a precipitation of iodide of silver from a solution of the nitrate, with a deficiency of iodide of potassium, we shall obtain a different coloured powder, which being spread upon paper, and subjected to solar influence, will at first turn brown, and, gradually deepening in tone, will finally assume a tint verging on black. It is quite clear that this latter compound is different in its behaviour, under the same conditions, to that before described; and, further, that from its mode of preparation, it is of different composition. Now, it is this latter compound (the *sub-iodide of silver*) that it is our endeavour to form on the paper in the Calotype process, previously to its exposure in the camera, and this end will be brought about in the most perfect manner, by the following method of operation :—

PREPARATION OF THE PAPER.

Pin the paper by two of its corners to the soft-wood board, and spread over its surface, by means of the glass-rod (page 47), a solution composed of

Iodide of potassium	20 grains.
Water	1 ounce.

Filter carefully before use.

After the paper is thoroughly covered, allow it to rest for two minutes, and then with a piece of perfectly clean blotting paper absorb the superfluous quantity, so as to leave the paper just surface dry; return it to the board, and having again secured it by means of the pins, repeat the operation with the aceto-nitrate of silver, prepared as follows:—

Crystallized nitrate of silver . .	30 grains.
Distilled water	1 ounce.
Glacial acetic acid	2 drachms.

This solution is also to be suffered to remain on the paper for the space of two minutes, after which interval, the outstanding liquid is to be removed by bibulous paper applied with a very light hand; this latter precaution is necessary in order to prevent the forcible removal of the sub-iodide of silver from the surface of the paper,—an accident of no unfrequent occurrence, if the blotting paper be applied too roughly.

If not required for immediate use, the paper thus iodized and rendered sensitive, may be hung up to dry, or may be placed while still damp in the dark frame, to await the exposure to the action of light in the camera.

Paper prepared by the above formula will, if carefully excluded from the light and air, by being placed between folds of blotting paper, keep good and sensitive for 24 hours.

The plan, however, which the Author has found best, is to prepare the paper early in the morning of the day on which it is to be used, and to develop the picture in the evening of the same day.

EXPOSURE IN THE CAMERA.

The time, as before stated, varies continually with every variation of circumstances, but from 3 to 10 minutes will be found the most usual range under ordinary conditions of light and subject. On removal from the camera, I generally prefer to see a slight trace of the picture,—such as the outline of the landscape against the sky,—this, when attentively observed, will be found a good criterion of the proper length of exposure to the luminous influence.

THE DEVELOPMENT OF THE PICTURE

Is performed by spreading the surface with the solution of gallic acid, by means of the glass rod,—taking special care that the paper be evenly covered, and that no part be allowed to become dry. This treatment is continued until the whole of the details of the picture become apparent, but still of a light colour; at this point, a few drops of aceto-nitrate of silver are to be added, and spread over it as quickly as possible, in order to deepen the tone, and to give vigour to the dark portions of the picture. When the development has been carried sufficiently far, which may be judged of as before directed—by carefully raising one corner of the paper, and viewing the impression by transmitted light—the picture is to be transferred to a pan of clean water, and thence to the

FIXING BATH,

Composed of 4 ounces of hypo-sulphite of soda to 1 pint of water, in which it is to soak for about ten minutes, until the whole of the yellow colour disappears, when removal to a vessel containing an abundance of water, will, after two hours soaking, complete the operation, of obtaining a negative by this process.

From the remarks made at the commencement of this paper it will hardly be apparent what part the acetic acid plays in the sensitive solution, but in order that the reader may be acquainted with the rationale of the process more fully, we propose to lay before him the following simple experiment:—

The reason for using the acetic acid in the sensitive solution, is to preserve the lights of the picture,—its mode of action will be seen thus:—

Precipitate some sub-iodide of silver in two test tubes; let one of them be exposed to the light, and the other carefully excluded from it; that exposed will present a slightly altered aspect—it will have become of a light buff colour. If now we add to each of these precipitations a saturated solution of gallic acid, both will turn nearly black; that which has been exposed being the first to show the change, the difference being apparently only one of intensity. Such, however, is not the case, for on adding a quantity of glacial acetic acid to each of the tubes, that which had undergone the influence of light will remain unaltered; while that which has been carefully excluded from its action will become clear, and present as pure a surface of yellow iodide of silver as at first; clearly showing that the acetic acid has the power of dissolving the oxide of silver that is let down by the action of the gallic acid, while it fails to disturb the deposit caused by the action of the solar influence.

It will be seen from the above that we have illustrated precisely the conditions that obtain in the Calotype picture, the dark parts retaining their intensity, while the parts which have not been acted upon by the light are preserved in all their integrity by the clearing action of the acetic acid.

WAXING PAPER NEGATIVES.

Negative pictures taken by either of the foregoing processes are much improved in transparency and definition by being saturated with white wax; the best mode of accomplishing which is to lay the picture face downwards on to a piece of blotting paper, and to pass over its back a flat iron that has been heated, at the same time a piece of perfectly pure white wax is to be held in contact with and made to follow the iron; the paper will by this means become impregnated with the wax, but on inspection it will be found that too large a quantity is on the surface; this is to be removed by placing the waxed picture between folds of perfectly clean blotting paper, and again passing a hot iron over the whole: by this operation the wax is again melted and the superfluous quantity absorbed by the super-imposed bibulous paper.

Pictures treated in this manner can be printed from with as much ease, and with almost as satisfactory results as those taken on glass, the detail being brought out in a remarkable degree, the wax counteracting to a very great extent the unevenness of texture in the paper which militates so powerfully against the perfection of paper photographs.

THE WAXED PAPER PROCESS.

APPARATUS REQUIRED IN THE WAXED PAPER PROCESS.

Tin dish, for waxing paper.
Argand lamp.
Porcelain pans.
Glass pan.
Horn forceps, for taking paper from baths.
Glass measures.
Funnel.

SOLUTIONS REQUIRED FOR THE WAXED PAPER PROCESS.

Iodide of cadmium	640 grains.
Bromide of cadmium	160 do.
Pure iodine	6 do.
Distilled Water	2 ounces.
Alcohol	2 do.
Skimmed milk	36 do.

Filter for use.

Nitrate of silver	400 grains.
Glacial acetic acid	10 drachms.
Distilled water	10 ounces.
Iodide of potassium	4 grains.

Gallic acid	1 drachm.
Water	40 ounces.

Hypo-sulphite of soda	4 ounces.
Water	1 pint.

Much has from time to time been written on this branch of the subject, and many are the plans recommended for obtaining photographic proofs on waxed paper. The following process will, however, be found to possess the great advantage of simplicity, compared with the original one as described by Le Gray, to whom the art is indebted for the invention of this beautiful method of producing sun pictures.

The natural divisions of the process are, 1st, waxing the paper; 2nd, iodizing the same; 3rd, rendering it sensitive; 4th, exposure to the image in the camera; 5th, development of the latent picture; 6th, fixing the proof.

1st. Waxing the paper. The paper most to be preferred for this process is that prepared by Canson frères. It is of an uniform texture and very thin, and is known at the shops as Canson's negative paper. A sheet of this is to be selected free from specks or blemishes of any sort, and treated in the manner following:—

Provide a flat tin dish about an inch deep (*Fig.* 11), and fit this into an outer one that can contain water, which is to be kept at boiling heat by means of a lamp placed beneath; three or four cakes of the best white wax being placed in the inner vessel and melted, a sheet of the selected paper is to be immersed in it, and allowed to remain in this position until perfectly saturated with the wax. It may then be carefully raised by two of its corners and held over the vessel to drain, after which it is to be hung up to get cold: sheet after sheet may be treated in the same way. When a sufficient number is thus prepared, each sheet is to be placed between folds of blotting paper, and to have a hot iron passed over it; this will cause the wax to be re-melted, and the superfluous quantity absorbed by the blotting paper, thereby giving an uniform transparency to the paper. If all the superfluous wax be not absorbed, the surface of the paper will exhibit patches of undue brilliancy, owing to the outstanding of the wax. The paper when properly prepared should present a perfectly even and uniform surface, and the transparency ought to be without irregularity.

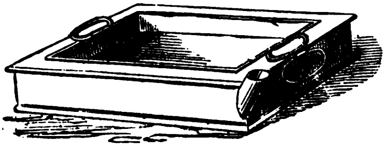


Fig. 11.

IODIZING THE WAXED PAPER.

This is accomplished by immersion in a bath prepared in the manner following:—

Dissolve 640 grains of iodide of cadmium, and 160 grains of bromide of cadmium, in two ounces of distilled water; next dissolve 6 grains of pure iodine in 2 ounces of alcohol of the specific gravity ·840: when the iodide and bromide of cadmium are dissolved, add them to 36 ounces, by measure, of skimmed milk, and thoroughly agitate, now add the alcoholic solution of iodine, and again shake the mixture.

It will be noticed that the caseine of the milk is by this means precipitated in the form of white curd, the mixture is to be thrown on a filter and the clear liquid preserved for use; this forms the iodizing solution for waxed paper, and consists of the whey or serum of milk impregnated with iodizing materials.

In order to iodize the waxed paper pour a sufficient quantity of the iodizing solution into a porcelain dish, and immerse the sheets in it one after another, taking great care that no air-bubbles are included between the surfaces of the paper and liquid; when a sufficient number have been immersed, they are to be allowed to soak for one hour, the whole mass of papers is then to be turned over in the liquid, in order to bring the sheet first immersed to the top; during the time of immersion the paper will have changed colour and will have assumed a purple tint, owing to the combination of the free iodine with the starch in the glaze of the paper. The sheets are now to be carefully removed from the bath, and hung up by the corners to dry.

The iodized paper when finished ought to be of a violet or purple tint, and should present rather a rough texture on the surface.

RENDERING THE PAPER SENSITIVE.

The sensitive bath is thus composed:

400 grains of crystallized nitrate of silver.
10 drachms of glacial acetic acid.
10 ounces of distilled water.
4 grains of iodide of potassium.

Filter a small quantity of this solution into a flat porcelain dish, as directed for iodizing, and float on to the surface a sheet of the iodized paper; allow it to rest for a few moments until the purple tinge is removed; then thoroughly immerse the sheet, and after waiting three minutes remove it by means of a pair of horn forceps (*Fig.* 12) to a pan of distilled water for the space of five minutes, occasionally agitating during the immersion. The paper thus prepared is to be placed between folds of bibulous paper, and finally hung up to dry.

Fig. 12.

If the above operations have been skilfully carried through, the paper will present an even coating of iodide of silver, and will keep sensitive for ten or twelve days at the least. I have used paper thus prepared after 15 days in cool weather. It should be preserved between leaves of clean blotting paper for use.

EXPOSURE IN THE CAMERA.

The time of exposure, as in all the other processes before described, must depend on various circumstances—With a 3-inch lens, and a stop of ¼-inch diameter, and an ordinary landscape, in bright weather from 5 to 15 minutes will be found sufficient, but if the weather be very dull, 20 minutes, will not overdo the picture; this will convey only an idea of the time required. The correct amount of exposure can alone be determined by experience.

DEVELOPMENT OF THE LATENT PICTURE.

Make a solution of gallic acid in water, of the strength of

Gallic acid	1 drachm.
Water	1 quart.

Filter this into a porcelain pan, and float the paper on its removal from the dark slide of the camera, taking care to exclude all air bubbles. The development will soon commence, if the right time of exposure has been given. When nearly all the picture is brought out, which may be seen through the back of the sheet, remove it from the pan, and add to the gallic acid solution some aceto-nitrate of silver—the same as used for *rendering* the paper sensitive—in the proportion of ½ a drachm of aceto-nitrate to 4 ounces of gallic acid solution; thoroughly mix, and immerse the partially developed proof; the details will soon begin to come out, and, at the same time, the dark parts of the picture will gather intensity; the degree of development may be judged of by holding the paper between the eye and the candle, or lamp, by the light of which we are operating. As in the Calotype process, we must guard against over-development, which will cause a deposit in the parts that ought to be transparent, thereby rendering the shadows in the resulting positive thick and muddy, instead of sharp and bright.

A word or two on over and under-exposure of the paper in the camera:—It will be seen from the directions given under that head, that a great latitude is given, because the waxed paper process is essentially rather slow in its results,—if the paper be under-exposed, the image will be a very long time before it makes its appearance, when under the influence of the gallic acid bath,—if, on the contrary, it has been over-exposed, the picture will come out in a few minutes, and will finally assume a reddish cast or hue, which will greatly interfere with the beauty of the positive impression,—the sky in a landscape will not present that opacity so essential to a successful proof, but will be patchy and uneven, showing some parts by transmitted light to be much lighter than others. The usual time of development of a picture is from half an hour to one and a half; but this is of little consequence, as several of them can be placed in the gallic acid bath together, after the picture has made its appearance, and developed at one time; some little care is necessary, however, in this part of the process, in order to prevent the staining that is so apt to occur. This may be obviated by occasionally turning the pictures in the bath, to remove any deposit that may have settled on their surfaces.

FIXING THE PROOF

Is effected by immersion of the paper in a solution of hypo-sulphite of soda, of the strength of—

Hypo-sulphite of soda	4 ouuces,
Water	1 pint,

and allowing it to soak until all the yellow colour is dispelled from the light parts; this will generally be the case in about ten minutes or a quarter of an hour, after which it is to be removed to a pan and well washed in abundance of cold water for about two hours, and finally it is to be hung up to dry. When perfectly dry, place the picture between folds of blotting paper, and pass a hot iron over it, in order to remelt the wax, and restore the transparency which has been partially lost during the various manipulations. This will complete the process of obtaining a negative picture on waxed paper.

The Author was led to the consideration of the Waxed Paper Process, from the assurance that it possessed advantages that were particularly required by the tourist and the photographer in search of the picturesque; in commencing his experiments, however, many difficulties presented themselves, such as the preparation of the serum of milk, &c., for the iodizing solution, and also the fact that when the iodized paper was immersed in the bath of the aceto-nitrate of silver, in order to be rendered sensitive to light, if great care were not taken to hit the exact time of immersion, the nitrate of silver attacked the freshly formed iodide of silver in the paper, and rendered it impossible to obtain a strong negative. Another difficulty occurred in the ordinary process, namely,—during the development of the picture by immersion in the gallic acid, the back part of the paper presented a muddy appearance, which tended to obscure the lighter parts of the view.

In pictures taken by the ordinary Waxed Paper Process, it not unfrequently happens that the skies are not perfectly uniform and black, but present, when viewed by transmitted light, innumerable little pinholes as it were; and, also, the outlines of the objects of the view, instead of being perfectly sharp and clear, appear, when viewed under a magnifier, to be serrated and irregular.

The whole of these inconveniences and difficulties are surmounted in the process we have just described,—in the first place, the serum is prepared and iodized at the same time by *the iodide and* bromide of cadmium,—the solvent power of the bath for iodide of silver is taken away by its previous saturation with that salt,—and the muddiness on the backs of the negatives is provided against and prevented by floating them until the picture is partially developed, instead of immersing them at once.

The sandy and gravelly skies that form so great a drawback to the Waxed Paper Process, as generally practised, are entirely removed by the use of iodide and bromide of cadmium, instead of iodide of potassium,—this latter salt, by crystallizing in the texture of the paper, being the cause of the transparent pinholes before alluded to. For the same reason, the outlines of the objects in the picture are clear and bright; and, lastly, the use of the salts of cadmium renders this process particularly applicable in India and hot climates generally,—the paper prepared as directed not being injuriously acted upon by moisture, as is the case where iodide of potassium is used.

For the information of those readers who may be about to practice this particular branch of photography, we would refer to an arrangement of camera particularly suited to open country work, with the paper processes, at page 18 of the catalogue at the end of this work (*Figs*. 23 to 26).

THE POSITIVE PAPER PROCESS.

APPARATUS REQUIRED FOR THE POSITIVE PAPER PROCESS.

Soft-wood board.
Glass rods.
Ditto measure.
Pins.
Reversing frame.

SOLUTIONS REQUIRED IN THE POSITIVE PAPER PROCESS.

Pure chloride of barium . . .	5 grains.
Distilled water	1 ounce.

Nitrate of silver	60 grains.
Distilled water	1 ounce.

Hypo-sulphite of soda	2 ounces.
Water	20 ounces.
Chloride of silver	20 grains.
Chloride of gold	15 grains.

Hypo-sulphite of soda	2 ounces.
Water	20 ounces.

The pictures obtained by any of the foregoing processes, are what are technically termed "negatives," that is to say, the natural light and shade of the subject is reversed,—the sky in a landscape presenting a black appearance, while the more shady parts are more or less transparent, according to the degree of shadow in which they were at the time of exposure.

In the case of a portrait by the Collodion process, the face, hands, &c., are black, while the coat and the dark clothes remain transparent, in proportion to the amount of light that has been reflected from their surfaces.

It is the design of the present process to reverse this order of things, and to produce pictures on paper from either glass or paper negatives, having the lights and shadows in their correct positions. The operation consists essentially in forming a chloride of silver on the surface of the paper, exposing this to the action of light, and then fixing the picture thus obtained.

PREPARATION OF THE PAPER.

The paper best adapted for the purpose, is either Canson's or Towgood's positive, and having selected a sheet free from specks and blemishes, prepare the following solution:—

Pure chloride of barium	5 grains.
Water, distilled	1 ounce.

Pin the paper, with the smoothest side upwards, to the soft*wood* board, and, by means of the glass rod, spread over its surface *the above solution; allow it* to stand for two minutes, and hang up to dry. Any number of sheets may be thus prepared, and kept in a portfolio free from damp, for an indefinite period. In order to make the paper sensitive, it must be again pinned to the board,—the salted side upwards, and the surface treated with the following solution:—

Nitrate of silver	60 grains.
Distilled water	1 ounce.

Suffer it to remain undisturbed for two minutes, and then hang up by two of its corners to dry. When dry, the paper is fit to be placed in the reversing frame to be exposed to the solar agency.

THE REVERSING FRAME.

If we expose a piece of the paper as prepared above to the agency of light, it will in a very short time become blackened; but if any opaque object be placed upon it, the part immediately beneath that object will remain perfectly white. It is on this principle that the production of positive pictures depends. Thus we place a piece of the prepared paper with its sensitive side upwards on any convenient support, and bring the face of the negative in contact with it. If now we allow the light to shine through the negative, we shall find on inspecting the positive paper underneath that a very decided action has taken place over those parts corresponding with the light portions of the superposed negative.

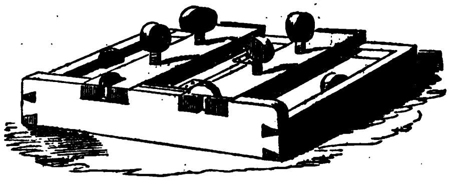


Fig. 13.

The mode of accomplishing this end in practice is by means of a frame of wood (*Fig.* 13), in which is fixed a stout plate of glass: on this we place the negative, either glass or paper, face upwards—that is, turned away from the surface of the glass. The sensitive side of the positive paper is now brought in contact with the negative, and a board, lined with cloth or velvet, is placed over.

the whole; this in its turn is pressed down hard so as to bring the two in close contact by means of suitable screws and fastenings.

The back board in the reversing frame is hinged, which allows the operator to examine the state of forwardness of the picture by releasing one side at a time, and carefully separating the positive paper from the negative. The picture, after exposure for the proper time to the light, ought to be somewhat darker than the desired colour, to counteract the effect of the toning bath which takes part of the intensity from it.

THE POSITIVE TONING BATH

Is composed of—

Hypo-sulphite of soda	2 ounces.
Water	1 pint.
Chloride of silver	20 grains.
Chloride of gold	15 do.

The positive picture which has been over-printed, as directed above, is plunged into this bath, and is allowed to remain immersed until the desired tint is acquired. Any tint may be obtained in this bath, from a rich sepia to a fine neutral tint, the time of immersion determining the exact shade of colour.

On being removed from the toning bath, the picture is to be immersed in the following

FIXING BATH,

Composed of—

Hypo-sulphite of soda	2 ounces.
Water, distilled	20 do.

The picture is to be allowed to remain in this bath for 10 minutes at least, in order to dissolve out all the chloride of silver remaining in the texture of the paper. It is essential that this should be the case, as it is this salt which plays the part of the sensitive agent in the positive paper.

On removal from the fixing bath, the picture is to be thoroughly washed in four or five waters, for five minutes in each; and, lastly, it is to be soaked for two hours in a capacious pan of clean water.

Suspension in a warm place to dry, and subsequent ironing, *will complete the process* of taking positive pictures on plain paper. There is, however, another method, or rather a modification of the last, by which the paper is coated with a layer of albumen, in which has been dissolved the chloride of barium. In this mode we obtain pictures of exquisite minuteness of detail, the surface on which the image is formed being free from those irregularities appertaining to ordinary paper.

ALBUMENIZED POSITIVE PAPER PROCESS.

The subjoined method of preparing the albumenized paper, will be found both certain and simple, and will give most excellent results :—

Throw the white of an egg into a deep dish, and add thereto five grains of chloride of barium dissolved in two drachms of water; beat the whole into a perfectly white froth by means of a wooden fork or whisk, and having placed a double thickness of fine muslin in a glass funnel, transfer the froth to it; in the course of a few hours nearly the whole of it will have subsided into a clear liquid, which will fall into the bottle placed to receive it. The paper being selected, and a quantity of the salted albumen being poured into a perfectly clean flat-bottomed dish, to the depth of half an inch, we gently place the centre of the sheet on to the surface of the liquid, and gradually lower the sides (taking special care to exclude all air-bubbles) until the whole surface of the paper is in contact with the albumen, where it must remain for the space of one minute, in order to absorb a coating of the same. Now, carefully, but quickly, remove the sheet by two of its corners, and holding it over the dish to drain, pin it to a suitable support (as the edge of a shelf) to become dry. When quite dry, place the sheet between two pieces of perfectly smooth paper, and pass a moderately hot iron over the back of it, in order to coagulate the albumen, and to render it insoluble in the subsequent washings to which it will be subjected during the process. Paper prepared according to the directions just given should present a fine glossy surface, free from any irregular patches, and should be of a pure white colour.

The Albumenized paper is rendered sensitive in precisely the same way as directed for the plain paper, namely, by being treated with a solution of Nitrate of Silver by means of the glass rod (page 63), the only precaution necessary to be observed is, that the glass rod must be very lightly applied, in order not to disturb the evenness of the surface. The time of allowing the silver solution to remain on, &c., is precisely the same as before described, as likewise the time of exposure in the reversing frame, the only difference being, that the Albumenized paper will take a longer time to assume the darker tones in the bath, than the paper prepared without the white of egg.

The fixing process is the same as with plain paper.

Pictures taken on this paper, for sharpness of outline and minuteness of detail, are immeasurably superior to those produced by the ordinary method.

If too much gloss be given to the paper by the adoption of the above formula, a little more water may be added to the white of egg; this will lessen the relative amount of albumen on the paper, and correspondingly diminish the gloss on the surface.

THE METHOD OF TAKING STEREOSCOPIC PICTURES.

Before entering upon the details of the plan by which stereoscopic pictures are produced, it may not be out of place to endeavour to put the reader in possession of the theoretical principles on which the stereoscope depends for its action. Every one is aware that the human subject possesses two eyes, but it is not so clear to most people what use is made of them as a means of informing the mind of the nature and condition of objects which are rendered visible through their agency. If we stand in a room, and look through a window, at objects on the opposite side of the street, we can pronounce of a certainty that the horse there waiting patiently for its rider is possessed of three dimensions—namely, length, breadth, and thickness, in fact that it is, as far as vision is concerned, a solid body; now by what means is this conviction formed in our minds? We say, by the impression formed on the brain, through the optic nerves, of two different images of the object, one formed on the retina of the right eye, the other on that of the left; for while still looking at the same object, if we close the right eye, and notice what part of the animal is intersected by a bar of the window, and then close the left and open the right, we shall find in the second case the same bar intersects quite a different part of the horse, clearly showing that on the retina of each eye we have formed quite a distinct image of object at which we are looking; it is the combination of these two images, through the agency of the optic nerves, that gives rise to our notions of solidity in objects presented to our notice.

Bearing this in mind, then, it is not difficult to conceive how it may be possible so to take, by means of the camera, two dissimilar pictures, and then, through the medium of an instrument called the stereoscope, so to combine these pictures as to render to the mind the idea of solidity of the object viewed. These conditions have been realized, and with the aid of photography, we are enabled to bring to our homes views of distant regions and works of art, that convey most exact ideas of locality and of the peculiar features of the subject under consideration.

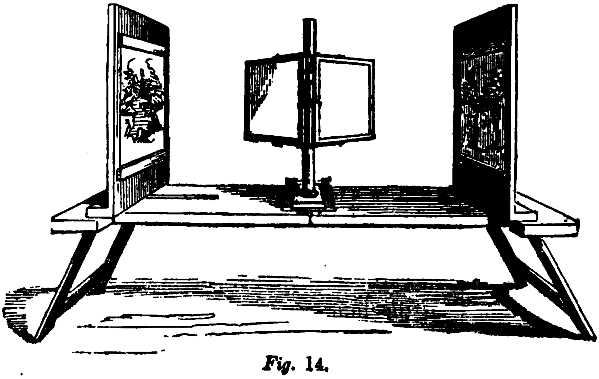


Fig. 14.

The stereoscope, as an optical instrument, exists in two forms, namely—the reflecting stereoscope, as originally designed by Professor Wheatstone, and the lenticular stereoscope of Sir David Brewster; each of these instruments possesses advantages peculiar to itself, the reflecting one being suited to the exhibition of views of any size, while the lenticular stereoscope is only adapted to pictures of small dimensions.

The reflecting stereoscope (*Fig.* 14), consists essentially of two mirrors, set at an angle of 90° to each other; opposite these mirrors, suitably supported, are placed the pictures to be viewed; the frames that support the pictures admit of every adjustment, so that the two images as seen by the eyes placed opposite the mirrors may be made to coincide.

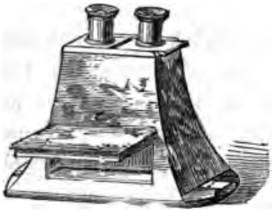
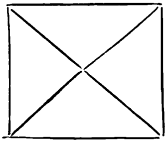


Fig. 15.

The lenticular strereoscope of Sir David Brewster (*Fig.* 15), consists of a box, shaped as in the figure, at the broad end of which the pictures are placed; immediately opposite these pictures are situated the eye-pieces that contain two semi-lenses, that is, lenticular prisms, so placed that their centres are coincident with the pupils of the eyes; the action of these semi-lenses is to cause the images viewed through them to overlap each other, so that instead of two pictures seen side by side, we have one picture visible in the apparent centre of the instrument, giving the true stereoscopic effect.

Stereoscopic pictures may be taken by an ordinary camera, or by cameras specially adapted for that purpose; for large pictures the ordinary landscape camera can be used with advantage; the mode of procedure is as follows:—Place the camera in the true position for taking the views, and having previously made a cross in pencil on the ground focussing-glass so as to intersect the centre of the picture thus, note, when focussing, the particular object or part of an object that falls on the intersection of the lines; then take the picture. When the exposure has been sufficient move the camera and stand bodily, as nearly



parallel to the plane of the view as possible through the space of four feet, and then focus for the second picture, taking care that the image of the same object or part of an object falls on the point of intersection of the lines on the focussing glass; the picture may then be taken, and when the negatives thus produced are printed from, and the results placed on their respective sides of the reflecting stereoscope, a most magical effect is produced, for on looking into the mirrors with both eyes, and adjusting the pictures so as to coincide, the views will appear in perfect relief; every part will show itself in its proper position, and the effect of solidity will be given to every object in the composition.

For small views used in the lenticular stereoscope, and for portraits, we use either of the cameras represented below. *Fig.* 16 represents a stereoscopic camera of the most simple form: it consists of a long camera box with a dark slide to hold the plate on which the two pictures are to be taken; the front which carries the lens is so made as to slide from side to side; the method of using the instrument is very simple,—the camera is placed immediately opposite the object to be taken, and the front, carrying the lens, is moved to one side; the object being focussed, the prepared plate is then placed in the dark slide and substituted for the ground focussing-glass. Now uncap the lens and expose the one half of the plate, replace the cap, and then shift the lens to the other side, and expose the other half for the same length of time. On development, the pictures, if properly exposed, will come out of the same intensity, and of uniform appearance. The negative thus produced can be printed from in the usual way, and the resulting pictures being mounted on card, can be viewed in the lenticular stereoscope, where all the peculiarities due to the manner in which they have been taken will manifest themselves. There is one point to which we must draw attention in mounting the pictures taken with this instru-

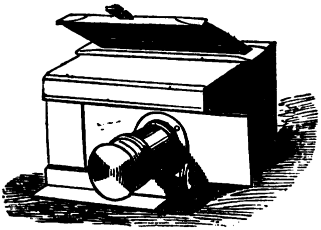


Fig. 16.

ment, namely, that they must be placed on the mounting card in the reverse position to that which they occupy when on the glass,—that is to say, the left hand one on the glass must occupy the right hand place on the cardboard mount,—otherwise, it is obvious from what has been before explained, that the true stereoscopic effect cannot be obtained.

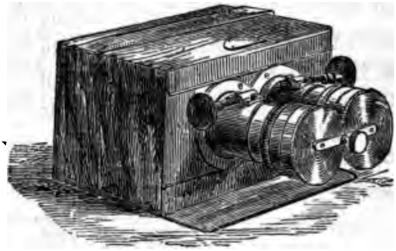


Fig. 17.

Fig. 17 represents a camera on the same principle, but fitted with two lenses of precisely the same focus; the caps of these lenses are so connected together, that they may be removed simultaneously, so that by this arrangement it is possible to take both pictures at the same instant; this will be found particularly convenient when the object is likely to move, as in the case of a portrait, where it is almost impossible for the sitter to keep in one position for any great length of time.

The same remark holds good in the use of this camera as with the last with regard to the mounting of the finished pictures,—in order to obtain the true stereoscopic effect, we have to reverse the position of the pictures, as before explained.

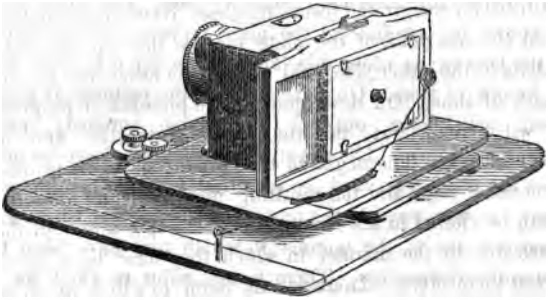


Fig. 18.

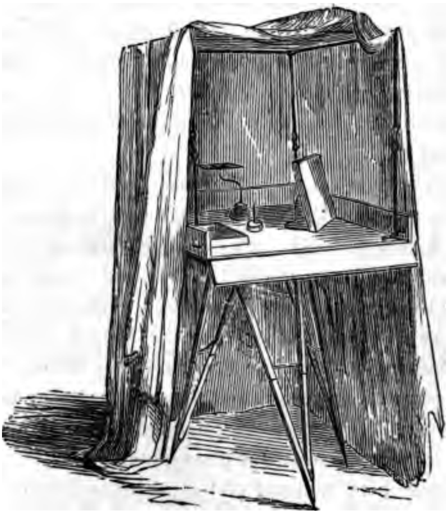
Fig. 18 is a drawing of another form of stereoscopic camera, and is by far the best adapted for taking views as well as portraits; it consists of an ordinary portrait camera, mounted on a board, which is furnished at its bottom with bars of wood; these bars are so fitted as to admit of adjustment, in order that the camera may be moved from right to left, and *vice versâ*, either on the same plane, or in the circumference of a circle; the back of the camera is so constructed, that the portion of it that holds the glass plate can slide from side to side; this is accomplished by means of a silk cord and spring attached to it, and also to an immovable pillar on the base board of the apparatus. When a picture is to be taken, the sliding back is to be removed, and replaced by the ground focussing-glass; the camera is then moved to the left as far as it will go, the focus being taken, and the position of any object marked on the screen, the camera is to be moved in the opposite direction until it comes to a stop; if the object before noted occupies this same spot on the ground glass, we may consider the adjustment perfect, but if not, we must alter the parallelism of the bars by means of the adjusting screws, and make a second trial.

When the two images occupy the same relative positions on the ground glass, we place the prepared plate in its proper position and draw the camera to the left, the right-hand side of the plate being opposite the lens; uncap the lens and expose the plate, then replace the cap and move the camera to the right hand, this motion will cause the slide that holds the plate to present its left side to the opening before the lens, again uncap the lens and take the second picture. The negative thus produced may be printed from, and the resulting positives mounted in the same relative positions as they occupied on the glass plate.

We may state here that any of the processes before described can be carried out with these cameras, but owing to the small size of the pictures perhaps the collodion or albumen processes are to be recommended in preference to those on paper.

In concluding the description of the various photographic processes on glass and paper, let me once more urge the necessity of attention to minute particulars in manipulation, and above all, that cleanliness should characterize our operation in the highest degree; without this feature no one can ever hope to attain proficiency in any department of this beautiful and interesting art, but on the contrary, the careless operator will meet with nothing but failures as a reward for his negligence on this head.

THE END.



TENT FOR WORKING COLLODION IN THE OPEN AIR.

H. SILVERLOCK, PRINTER, DOCTORS' COMMONS, LONDON.

ILLUSTRATED CATALOGUE

OF

APPARATUS & CHEMICAL PREPARATIONS

USED IN THE ART OF

PHOTOGRAPHY;

COMPRISING THE

DAGUERREOTYPE, CALOTYPE, WAXED PAPER,
ALBUMEN, COLLODION,
AND POSITIVE PAPER PROCESSES.

MANUFACTURED AND SOLD BY

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PHILOSOPHICAL, PHOTOGRAPHICAL, & CHEMICAL INSTRUMENT MAKERS,

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1856.

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PREFACE.

MESSRS. BLAND & LONG,

In submitting the following Catalogue of Instruments, Apparatus, and Chemical Preparations used in the beautiful Art of Photography, to the notice of Amateurs and Photographers in general, would take this opportunity of stating, that nearly the whole of the Apparatus therein described is manufactured on the premises, under their own immediate superintendence; thereby ensuring instruments with all the most recent improvements, and at very moderate prices.

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Catalogue

OF

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LENSES.

Single Achromatic Lenses, unmounted, suitable for taking views by Calotype or Collodion processes :—

	Diameter.	Focus.	£	s.	d.
No. 1.	1¼ inches	4 to 6 inches	0	6	0
2.	1½ "	6 to 7 "	0	8	0
3.	1¾ "	6 to 8 "	0	10	0
4.	2 "	8 to 10 "	0	14	0
5.	2¼ "	8 to 10 "	0	18	0
6.	2¾ "	12 to 14 "	1	6	0
7.	3 "	12 to 15 "	1	16	0
8.	3½ "	12 to 16 "	2	10	0
9.	4 "	16 to 20 "	3	10	0

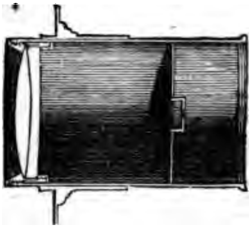

Fig. 1.

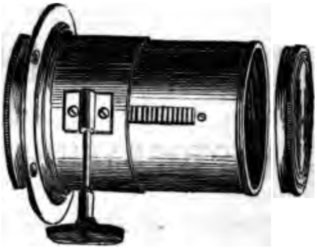

Fig. 2.

Single Achromatic Lenses, mounted in handsome brass fronts, with rings for adaptation to Camera:—

	Diameter.	**Simple sliding tube.** (*Fig.* 1.)			**For Pictures.**	**Rack and Pinion.** (*Fig.* 2.)		
		£	s.	d.		£	s.	d.
No. 1.	1¼ inches	0	16	0	5 in. by 4 in.	1	1	0
2.	1½ "	1	1	0		1	7	0
3.	1¾ "	1	5	0	6 " by 5 "	1	12	0
4.	2 "	1	12	6		2	2	0
5.	2¼ "	1	15	0	7 " by 6 "	2	7	6
6.	2⅝ "	2	5	0	9 " by 7 "	2	15	0
7.	3 "	3	15	0	11 " by 9 "	4	10	0
8.	3½ "	4	14	6	12 " by 10 "	6	0	0
9.	4 "	6	10	0	15 " by 12 "	7	7	0

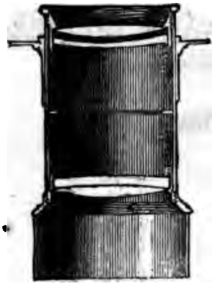

Fig. 3.
Sectional view of Compound Achromatic Lens.

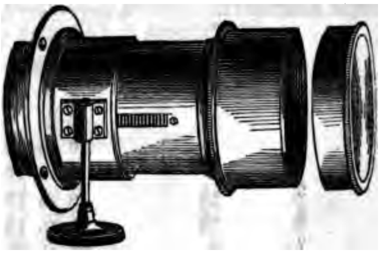

Fig. 4.

BLAND & LONG'S

COMPOUND ACHROMATIC LENSES FOR PORTRAITS.

These combinations are particularly recommended from the qualities they possess of giving a flat field, and having their optical and chemical foci coincident, producing an image on the sensitive surface in an extremely short space of time.

Combination Achromatic Lenses, mounted in handsome brass fronts, with rackwork adjustment, and adapted for either portraits or views:—

		£	s.	d.
No. 1.	For pictures, 4¼ by 3¼ inches (*Fig.* 4.) .	3	13	6
2.	" arranged for views, 6 by 5 in., and portraits, 4¼ by 3¼ in.	4	0	0
3.	" 5 by 4 in.	4	14	6
4.	" arranged for views, 7 by 6 in., and portraits, 5 by 4 in.	5	5	0
5.	" 6 by 5 in.	7	7	0
6.	" arranged for views, 9 by 7 in., and portraits, 6 by 5 in.	8	0	0
7.	" 8½ by 6½ in.	15	15	0
8.	" arranged for views, 12 by 10 in., and portraits, 8½ by 6½ in.	16	16	0

The arrangement of the above Lenses for views, consists in the removal of one lens in the combination, and placing the other in a different position in the sliding tube, with the requisite stops or diaphragms for regulating the amount of light.

COMPOUND ACHROMATIC FOREIGN LENSES FOR PORTRAITS.

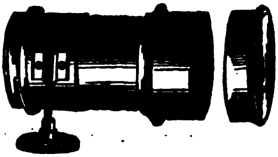

Fig. 5.

		£	s.	d.
No. 1.	For pictures, 4¼ by 3¼ inches (*Fig.* 5.) .	1	7	6
2.	" 6½ by 4¾ " . . .	3	10	0
3.	" 8½ by 6½ " . . .	8	0	0

BLAND & LONG'S ACHROMATIC LANDSCAPE LENSES.

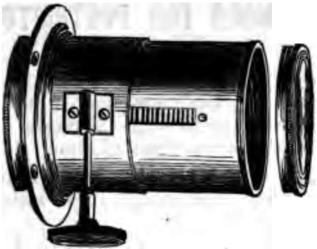

Fig. 6.

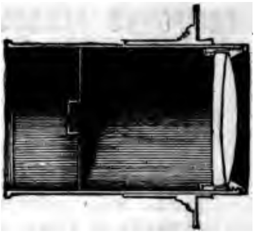

Fig. 7.
Section of Landscape Lens.

Messrs. B. & L. feel great confidence in recommending these Lenses to amateurs and professional photographers, as they give a perfectly flat field, and from their quick action are particularly adapted for taking views where great rapidity is a desideratum.

No.	Diameter				Pictures	£	s.	d.
No. 1.	1¾ in.	diameter,	rackwork	adjustment, for pictures	6 by 5 in.	2	12	6
2.	2¼	"	"	"	7 by 6 in.	3	10	0
3.	3	"	"	(*Fig.* 6.)	10 by 8 in.	5	10	0
4.	3½	"	"	"	12 by 10 in.	6	10	0
5.	4	"	"	"	15 by 12 in.	8	8	0

MENISCUS LENSES.

	Diameter.	Focus.	£	s.	d.
No. 1.	1¾ inches	8 to 10 inches	0	4	0
2.	2 "	9 to 10 "	0	5	0
3.	2¾ "	10 to 12 "	0	7	6
4.	3 "	12 to 14 "	0	9	0
5.	3½ "	14 to 16 "	0	10	6

MIRRORS.

Parallel Mirrors for placing in front of the Lenses, to take pictures in their true position

	£	s.	d.
For ¼ plate Lens	1	10	0
½ "	2	12	6
Prisms adapted for same purpose, from	3	3	0

PHOTOGRAPHIC CAMERAS,

ADAPTED FOR VIEWS ON GLASS OR PAPER.

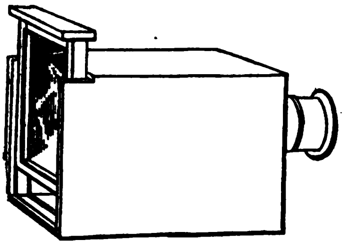

Fig. 8.

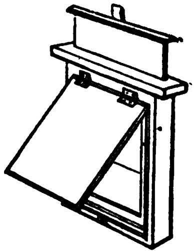

Fig. 9.

RIGID CAMERAS.

		£	s.	d.
No. 1.	**Mahogany French-polished Camera,** (*Fig.* 8,) with one single back, (*Fig.* 9,) for either paper or glass, and ground focussing glass, for pictures 6 by 5 in.	0	18	6
No. 2.	Ditto, ditto, same as above, for either glass or paper process, fitted with single Achromatic lens, 1¾ inches diameter, in brass sliding tube . .	2	5	0
No. 3.	**Mahogany Camera,** French-polished, with one back, for either glass or paper process, ground focussing glass, &c., for pictures 7 by 6 inches	1	2	6
No. 4.	Ditto, ditto, fitted with single Achromatic lens, 2¼ in. diameter, mounted in brass sliding tube	1	17	6
No. 5.	**Mahogany Camera,** French-polished, with one back, for either glass or paper process, ground glass for focussing, for pictures 9 by 7 inches	1	11	6
No. 6.	Ditto, ditto, fitted with single Achromatic lens, 2⅝ in. diameter, mounted in brass sliding tube	3	16	6
No. 7.	**Mahogany Camera,** French polished, with one back, for either paper or glass process, ground focussing glass, for pictures 10 by 8 inches .	1	15	0
No. 8.	**Mahogany Camera,** fitted with single Achromatic lens, 3 inches diameter, mounted in brass sliding tube, for pictures 10 by 8 in. . .	5	10	0

	£	s.	d.
No. 9. **Mahogany Camera**, French-polished, with one back, for paper or glass process, ground focussing glass, for pictures 11 by 9 inches . . .	1	17	6
No. 10. Ditto, ditto, fitted with single Achromatic lens, 3 in. diameter, mounted in brass sliding tube .	6	0	0

Extra openings made in any of the above Cameras for the purpose of adapting portrait Lenses:—

Size.			
6 by 5 inches	5s.	9 by 7 inches	6s. 6d.
7 by 6 "		10 by 8 "	
		11 by 9 "	

Sliding fronts adapted to the above Cameras for the adjustment of foreground and sky:—

Size.			
6 by 5 inches	6s.	9 by 7 inches	9s.
7 by 6 "		10 by 8 "	
		11 by 9 "	

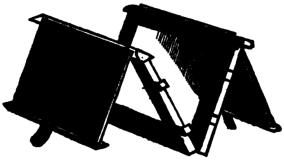

Fig. 10.

Double Backs for paper fitted to above Cameras:—(*Fig.* 10.)

7 by 6 inches .	£1 0s.	10 by 8 inches .	£1 10s.
9 by 7 " .	£1 5s.	11 by 9 " .	£1 15s.

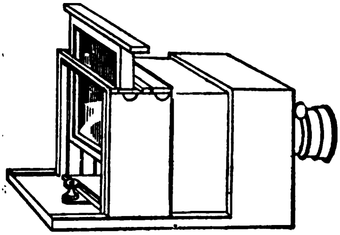

Fig. 11.

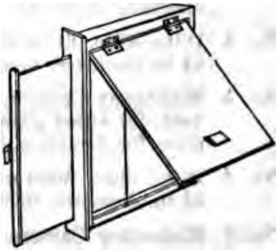

Fig. 12.

SLIDING BODY OR EXPANDING CAMERAS,

Adapted for portraits by the Collodion or Daguerreotype processes

		£	s.	d.
No. 1.	**Sliding body Camera,** (*Fig.* 11) of French-polished mahogany, with one single (*Fig.* 12) back 5 inches square, with two loose frames for plates 4¼ by 3¼ inches, and 3¼ by 2¾ inches	1	7	6
No. 2.	Ditto, ditto, fitted with Achromatic portrait lens, of **best construction**	5	0	0
No. 3.	Ditto, ditto, fitted with Foreign lens	2	15	0
No. 4.	**Mahogany sliding body Camera,** French-polished, with one single back 6 inches square, with two loose frames for plates 5 by 4 inches, and 4¼ by 3¼ inches, ground focussing glass, &c.	1	15	6
No. 5.	Ditto, ditto, fitted with compound Achromatic portrait lens, of **best construction**	7	0	0
No. 6.	Ditto, ditto, fitted with foreign lens	5	5	0
No. 7.	**Mahogany sliding body Camera,** French-polished, single back 8 inches square, with two loose frames for plates 6 by 5 inches, and 5 by 4 inches, ground focussing glass, &c	2	10	0
No. 8.	Ditto, ditto, fitted with compound Achromatic lens, for portraits, of **best construction**	9	17	0
No. 9.	Ditto, ditto, fitted with Foreign lens	6	0	0
No. 10.	**Mahogany sliding body Camera,** French-polished, with one single back 10 inches square, with three loose frames for plates 8½ by 6½ inches, 6 by 5 inches, and 5 by 4 inches, ground focussing glass, &c.	3	10	0
No 11.	Ditto, ditto, fitted with compound Achromatic portrait lens, of **best construction**	19	5	0
No. 12.	Ditto, ditto, fitted with Foreign lens	11	10	0

FRENCH CAMERAS IN WALNUT,

UNPOLISHED.

		£	s.	d.
No. 1.	¼-plate **Walnut Camera**	0	13	6
No. 2.	Ditto, fitted with compound lens, for portraits	2	2	0
No. 3.	½-plate **Walnut Camera**	0	18	0
No. 4.	Ditto, fitted with compound lens, for portraits	4	8	0
No. 5.	Whole plate **Walnut Camera**	1	12	6
No. 6.	Ditto, fitted with compound lens, for portraits	9	12	6

FRENCH WALNUT WOOD CAMERAS, SQUARE.

		£	s.	d.
No. 1.	¼-plate square Camera, walnut wood . .	0	18	6
No. 2.	Ditto, ditto, fitted with compound Achromatic lens, for portraits up to 4¼ by 3¼ inches .	2	6	0
No. 3.	½-plate walnut Camera, square . . .	1	12	0
No. 4.	½-plate walnut Camera, square, fitted with compound Achromatic lens, for portraits up to 6½ by 4¾ inches	5	2	0
No. 5.	Whole plate square walnut Camera . . .	2	2	0
No. 6.	Ditto, ditto, fitted with compound Achromatic lens, for portraits up to 8½ by 6½ inches .	10	0	0

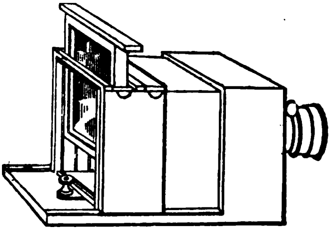

Fig. 13.

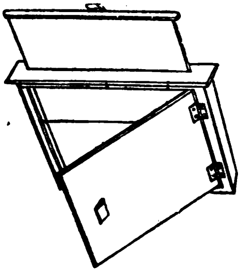

Fig. 14.

SLIDING BODY OR EXPANDING CAMERAS,

Adapted for portraits and views by the Collodion and Calotype, or Waxed-paper processes.—(Fig. 13 & 14.)

		£	s.	d.
No. 1.	**Mahogany sliding body Camera**, French-polished, with two single (*Fig.* 14) dark slides for plates and paper, suitable for portraits 4¼ by 3¼ inches, and views 6 by 5 inches . .	2	6	0
No. 2.	Ditto, ditto, fitted with compound Achromatic lens, of BEST CONSTRUCTION, adapted for either portraits 4¼ by 3¼ inches, or views 6 by 5 inches	6	6	0
No. 3.	**Mahogany sliding body Camera**, with two single dark slides for plates and paper, suitable for portraits 5 by 4 inches, and views 7 by 6 inches	2	16	0
No. 4.	Ditto, ditto, fitted with compound Achromatic lens, of BEST CONSTRUCTION, adapted for either portraits 5 by 4 inches, or views 7 by 6 inches	8	0	0

		£	s.	d.
No. 5.	**Mahogany sliding body Camera,** French-polished, with two single dark slides for plates and paper, suitable for portraits 6 by 5 inches, and views 9 by 7 inches	8	13	6
No. 6.	Ditto, ditto, fitted with compound Achromatic lens, of BEST CONSTRUCTION, adapted for either portraits 6 by 5 inches, and views 9 by 7 inches	11	13	6
No. 7.	**Mahogany sliding body Camera,** French-polished, with two single dark slides for plates and paper, suitable for portraits 8½ by 6½ inches, and views 11 by 9 inches	5	10	0
No. 8.	Ditto, ditto, fitted with compound Achromatic lens, of *best construction*, adapted for portraits 8½ by 6½ inches, and views 11 by 9 inches .	22	6	0

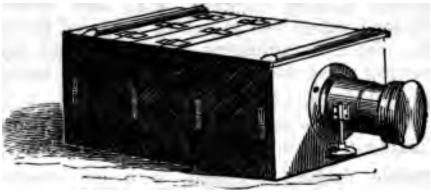

Fig. 15.

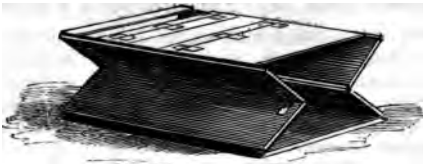

Fig. 16.

BLAND & LONG'S PORTABLE FOLDING CAMERAS.

This form of Camera will be found of great convenience where portability is a desideratum, and consequently most efficient for the purposes of the tourist and traveller.

These Instruments are of the best workmanship, and are so constructed as not to warp nor lose their figure when exposed to the sun and weather in any climate.

		£	s.	d.
No. 1.	**Portable folding Camera,** (*Figs.* 15, 16,) **of best** Spanish mahogany, French-polished, with one double back for holding two pieces of prepared paper, sliding front for adjusting foreground and sky, focussing glass, &c., for pictures 7 by 6 inches	4	0	0
No. 2.	Ditto, ditto, fitted with single Achromatic lens, mounted in brass sliding tube, for pictures 7 by 6 inches	5	15	0
No. 3.	**Portable folding Camera,** with one double back for holding two pieces of prepared paper, sliding front for adjusting foreground and sky, focussing glass, &c., for pictures 9 by 7 inches	4	14	6
No. 4.	Ditto, ditto, fitted with single Achromatic lens, 2⅜ inches diameter, mounted in brass sliding tube, taking pictures 9 by 7 inches . . .	6	19	6
No. 5.	**Portable folding Camera,** with one double back for holding two pieces of prepared paper, sliding front for adjusting foreground and sky, focussing glass, &c., for pictures 10 by 8 inches	6	0	0
No. 6.	Ditto, ditto, fitted with single Achromatic lens, 3 inches diameter, mounted with rackwork adjustment, taking pictures 10 by 8 inches .	10	10	0
No. 7.	**Portable folding Camera,** with one double back for holding two pieces of prepared paper, sliding front for adjusting foreground and sky, focussing glass, &c., for pictures 11 by 9 inches	7	0	0
No. 8.	Ditto, ditto, fitted with single Achromatic lens, 3 inches diameter, mounted with rackwork adjustment, taking pictures 11 by 9 inches *This size is particularly recommended as taking the quarter sheet of waxed paper without cutting in the least to waste.*	11	10	0
No. 9.	**Portable folding Camera,** with one double back for holding two pieces of prepared paper, sliding front for adjusting foreground and sky, focussing glass, &c., for pictures 12 by 10 inches	7	17	6
No. 10.	Ditto, ditto, fitted with single Achromatic lens, mounted with rackwork adjustment, producing pictures 12 by 10 inches	13	17	6
No. 11.	**Portable folding Camera,** with one double back for holding two pieces of prepared paper, sliding front for adjusting foreground and sky, ground focussing glass, &c., for pictures 15 by 12 inches	10	0	0

	£	s.	d.
No. 12. **Portable Folding Camera**, &c., fitted with single Achromatic lens, mounted in rackwork adjustment, for producing pictures 15 by 12 inches	17	7	0

Larger sizes to order

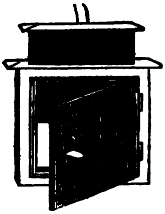

Fig. 17.

Single backs (*Fig.* 17) for Collodion fitted to the above Cameras with two loose frames:—

For 7 by 6 inches	£0	15	0		For 11 by 9 inches	£1	5	6
9 by 7 "	0	18	0		12 by 10 "	1	7	0
10 by 8 "	1	2	6		15 by 12 "	1	15	0

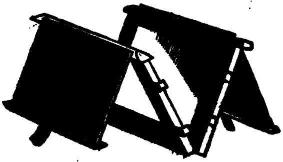

Fig. 18.

Extra double backs (*Fig.* 18) fitted to the above Cameras:—

For 7 by 6 inches	£1	0	0		For 11 by 9 inches	£1	15	0
9 by 7 "	1	5	0		12 by 10 "	2	0	0
10 by 8 "	1	10	0		15 by 12 "	2	15	0

In the Cameras detailed above there is an extra opening for short focus compound lens which can readily be adapted to any of them, the price varying with the size lens employed. (*See page* 7.)

Messrs. BLAND & LONG also fit their compound Achromatic lenses to these Cameras, which render them applicable for taking either portraits or views by merely altering the lens.

Bland & Long's portable folding Cameras, fitted with compound Achromatic lenses, in handsome brass mounting with rackwork adjustment, and capable of being altered for both portraits and views.

		£	s.	d.
No. 1.	**Portable folding Camera,** of French-polished mahogany, sliding front for adjustment of foreground and sky, one double back for paper and one single back, with two loose frames for Collodion, fitted with compound lens, of best construction, capable of producing portraits 5 by 4 inches, and views 7 by 6 inches .	9	0	0
No. 2.	**Portable folding Camera,** of French-polished mahogany, fitted with compound Achromatic lens, of best construction, capable of producing portraits 6 by 5 inches, and views 9 by 7 inches	13	0	0
No. 3.	**Portable folding Camera,** of French-polished mahogany, for producing portraits 8½ by 6½ inches, and views 12 by 10 inches . .	26	0	0

Fig. 19.

SOLID PATENT LEATHER SLING CASES,

For folding Cameras. (*Fig.* 19.)

		£	s.	d.
No. 1.	**Solid leather sling Case,** for containing Camera and lens, for pictures 7 by 6 inches . . .	1	5	0
No. 2.	Ditto, ditto, for pictures 9 by 7 inches . .	1	12	0
No. 3.	Ditto, ditto, for pictures 12 by 10 inches . .	2	10	0

Leather sling Cases, for lenses only, 10s., 15s., 17s. 6d., and £1.

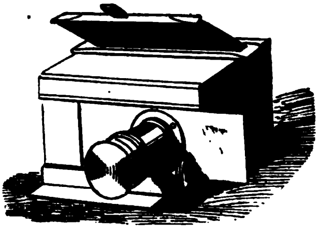

Fig. 20.

Fig. 21.

STEREOSCOPIC CAMERAS,

For producing either portraits or views suitable for the Stereoscope.

		£	s.	d.
No. 1.	**Stereoscopic Camera,** of most simple construction, fitted with compound Achromatic lens in sliding front, one single back for plates, ground focussing glass, &c. (*Fig.* 20.)	3	3	0
No. 2.	Stereoscopic Camera, fitted with two compound Achromatic lenses of same focus, one single back for plates, ground focussing glass, &c. (*Fig.* 21.)	5	5	0

With this Camera both pictures are taken at the same instant.

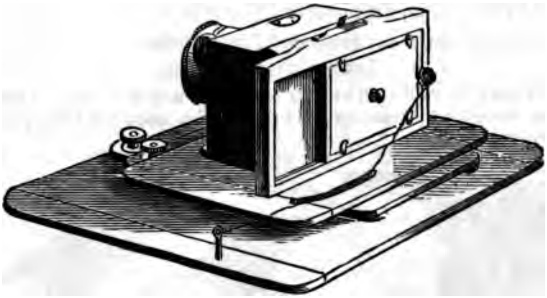

Fig. 22.

		£	s.	d.
No. 3.	Stereoscopic Camera, of best construction, mounted on boards, with parallel adjustments on Latimer Clarke's principle, with compound Achromatic lens, capable of taking either portraits or views (*Fig.* 22.)	6	0	0

It is necessary to state that the pictures taken by Nos. 1 and 2, require to be reversed when they are mounted, in order to obtain the true stereoscopic effect.

BLAND & LONG'S REGISTERED SEMI-FOLDING CAMERA.

This form of Camera will be found to possess great advantages over any other form hitherto introduced. It does not let in the light when subjected to the influence of any climate, is extremely portable, and enables the operator to take a small stock of paper and chemicals to the scene of his labours. The arrangement of this Camera is so complete, that no more space is taken up than is actually occupied by the material of which the instrument is made: two double and one single backs are supplied with these Cameras, and a tray is arranged at the top to take the chemicals. Being made on the principle of the expanding Camera, they admit of being used with any lens, giving a great range of focal adjustment.

		£	s.	d.
No. 1.	**Bland and Long's Registered semi-folding Camera,** consisting of solid body, folding sliding body, vertical and horizontal adjustment for foreground and sky, two double backs for paper process, one single back with two loose frames for glass plates, tray for holding chemicals, &c., with lock and handle, for pictures 9 by 7 inches and under	7	7	0
No. 2.	Ditto, ditto, for pictures 10 by 8 inches . .	8	10	0
No. 3.	Ditto, ditto, for pictures 11 by 9 inches . .	10	10	0

Larger sizes to order.

It may be well to mention here that any lens can be adapted to the foregoing Cameras. They can be used for both portraits and views.

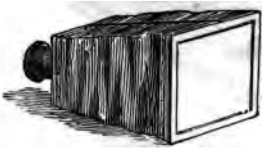

Fig. 23.

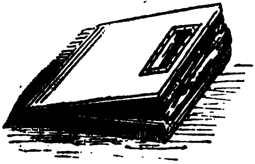

Fig. 24.

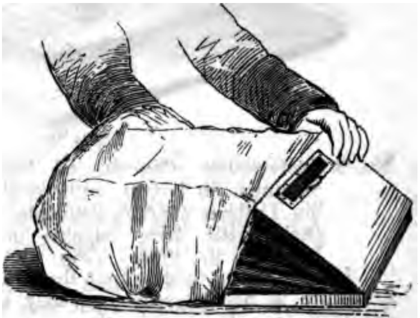

Fig. 25.

BLAND & LONG'S IMPROVED ELASTIC FOLDING CAMERA

With Apparatus for changing the papers in paper process.

(*Figs.* 23, 24, 25.)

This form of Camera has been devised with a view to extreme portability, and at the same time that the parts of it should be of such a nature as not to readily get out of order. The Camera consists of a firm bottom board, having the front which holds the lens, of mahogany hinged to it; the frame, which is destined to carry the dark slide and focussing glass, is hinged at the other end. The intervening space is, or more properly the three remaining sides are, made of waterproof black silk, which material from its strength and flexibility is admirably adapted for the purpose. A light bar of metal passes between the front and back frames to keep them properly asunder; on removal of this bar, the front from which the lens has been unscrewed folds down parallel with the bottom of the Camera, and the frame in which the focussing glass remains folds over that, forming a very portable and extremely flat parcel. The back supplied with this Camera for use with the Apparatus for changing the papers in the open air is single; double ones are as readily adapted to this as to any other form of Camera.

Everybody who has worked with the waxed or any other paper process, has found the difficulty of changing his sensitive papers while on an excursion. The Changing Apparatus figured in margin may be used with perfect ease and success in the most blazing sun, without danger of injury to the sensitive surface; it consists of a portfolio of two compartments arranged in a light wood box, the cover of which lifts up (as shown in *Fig.* 26). To the open end of this box is fastened a yellow calico bag, having an aperture secured by a ring of vulcanized India rubber at one side near the end. The portfolio occupies the bottom of the box, and when not

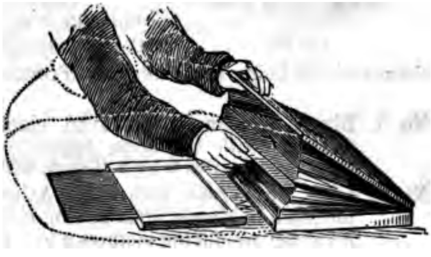

Fig. 26.

in use the calico bag is folded up and rests on the top of it, and allows the lid of containing box to shut (as shown at *Fig.* 24) There is a yellow glass window in the lid, which enables the operator to see what he is about while changing his papers.

The method of using the Changing Apparatus is as follows:—The upper compartment of the portfolio contains the sensitive papers face downwards, a sheet of blotting paper being placed between each; the dark slide of the Camera is now inserted through the opening in the yellow bag, and is followed by the right hand of the operator, who with his left raises the lid of the containing box. The door of the slide being now opened, the paper which has undergone exposure may be slipped into the under compartment of the portfolio, and a fresh piece substituted from the upper one; any number can be thus changed without trouble or the danger of injury to the sensitive surface. The space occupied by this simple piece of apparatus is extremely small, and the weight is a mere trifle.

Fig. 27.

The Camera, Lens, and Changing Apparatus, complete, for pictures 9 by 7 inches, occupy a space included in leather case 14 inches long, 11 inches wide, and 4 inches deep (*Fig.* 27).

Messrs. BLAND & LONG have had practical experience in the working of this new apparatus, and can confidently recommend it as being the desideratum of the photographer on paper, its chief characteristics being EFFICIENCY, PORTABILITY, and CHEAPNESS.

		£	s.	d.
No. 1.	**Bland & Long's improved elastic folding Camera,** with Changing Apparatus, &c., complete, for pictures 9 by 7 inches, without lens .	3	13	6
No. 2.	Ditto, ditto, fitted with single Achromatic lens, mounted in simple brass sliding tube, 2⅜ inches diameter, producing pictures 9 by 7 inches .	5	18	6
No 3.	**Improved elastic folding Camera,** with Changing Apparatus, &c., complete, for pictures 10 by 8 inches, without lens	4	14	6
No. 4.	Ditto, ditto, fitted with single Achromatic lens, mounted in brass front, with rackwork adjustment, 3 inches diameter, producing pictures 10 by 8 inches	9	4	6

		£	s.	d.
No. 5.	**Improved elastic folding Camera**, with Changing Apparatus, &c., complete, for pictures 11 by 9 inches, taking the ¼ Canson's sheet of waxed paper, without lens	5	10	0
No. 6.	Ditto, ditto, fitted with single Achromatic lens, mounted in brass front, rackwork adjustment, 3 in. diameter, producing pictures 11 by 9 in.	10	0	0

Leather sling Cases for the above Cameras, (*Fig.* 27) size, 9 by 7 inches, £1 5s.; 10 by 8 inches, £1 15s.; 11 by 9 inches, £2.

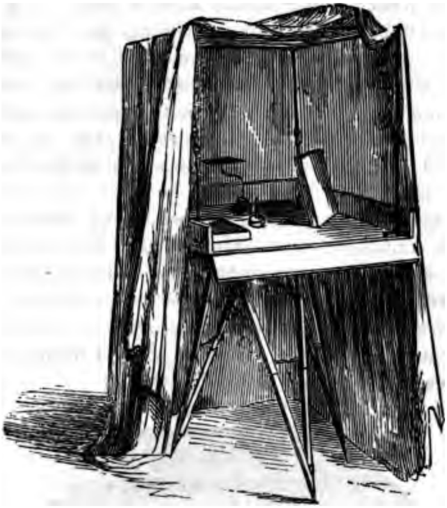

Fig. 28.

BLAND & LONG'S NEWLY-INVENTED PORTABLE DARK TENT,

For working the Collodion process in the open country. (*Fig.* 28.)

A good substitute for a dark room has long been a desideratum to the photographer in Collodion, and we have much pleasure in submitting the present invention to the notice of photographers generally, as combining all that can be required for the purposes of open air work.

The tent consists of a strong and roomy table, mounted on a firm Tripod Stand; from the top of the table at each corner rise four jointed spring supports, these support a frame over which is stretched yellow calico of three thicknesses; a black calico envelope covers the whole, and enables the operator to work with as great ease in the open country as he would in his own laboratory at home. The black envelope is furnished with a circular aperture at the top for admitting light to the interior of the tent, there is also a curved bar which keeps the covering from touching the head of the operator while at work. The envelope is bound at its edge with strong webbing, and iron spikes are attached at intervals in order to secure it to the ground and prevent the wind and light from getting into the tent.

When not in use, the springs that support the yellow calico chamber double inwards and fall quite flat, like an opera hat; the legs of Tripod then fold up and are laid on top; finally, the black calico envelope is folded up and laid over these immediately under the cover which secures the whole, the table of the tent forming the containing box. These tents have been in use for some time, and we can pronounce them to answer perfectly and to fulfil all the conditions required in such an apparatus.

The extreme size of outside containing box of a tent, suitable for an operator, 6 feet high, is 24 by 18 by 4 inches, forming a very portable and compact case (*Fig.* 29.)

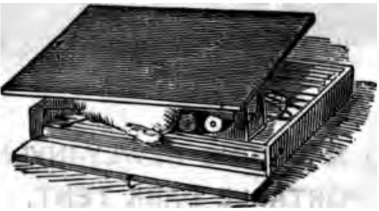

Fig. 29.

	£	s.	d.
BLAND & LONG's portable Tent, for working Collodion in the open air, complete (*Fig.* 28) . .	5	5	0

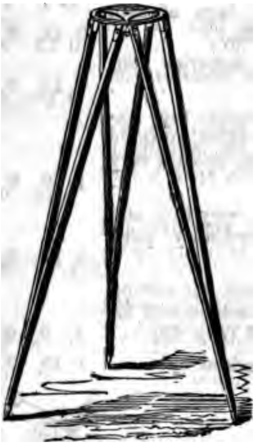

Fig. 30.

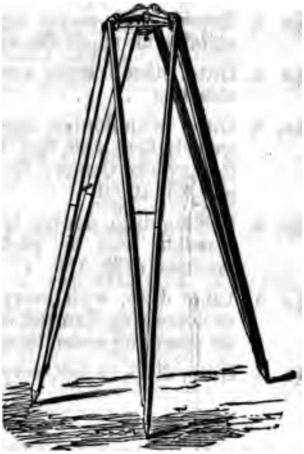

Fig. 31.

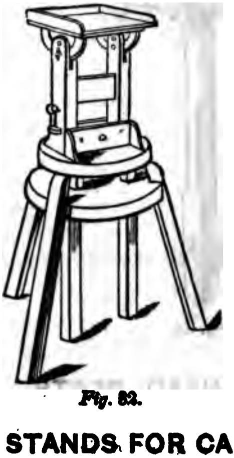

Fig. 32.

TRIPOD STANDS FOR CAMERAS.

To ensure success in taking either portraits or views, it is absolutely essential that the Camera should be perfectly free from vibration; if this be not the case, it is obviously impossible to obtain a perfectly sharp impression. Lightness, with freedom from vibration, are combined in the Stands offered in the following list:—

		£	s.	d.
No. 1.	Tripod, with metal top, double legs of ash, suitable for small Camera (*Fig.* 30.)	0	12	0
No. 2.	Ditto, ditto, larger size, and of superior construction	0	18	0
No. 3.	Ditto, with double legs of ash, metal top, extremely firm and free from vibration, suitable for any size Camera, forming when apart a very portable stand	1	10	0
No. 4.	Folding ditto, double legs of ash, very firm and portable, can be packed in ordinary portmanteau (*Fig.* 31)	1	17	6
No. 5.	Table ditto, with every adjustment for raising or depressing Camera, extremely convenient for an operating room, in white wood (*Fig.* 32)	1	5	0
No. 6.	Ditto, ditto, in oak, very strong indeed	1	15	0

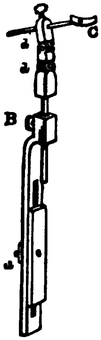

Fig. 33.

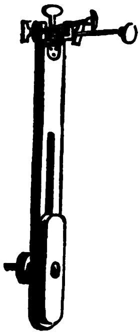

Fig. 34.

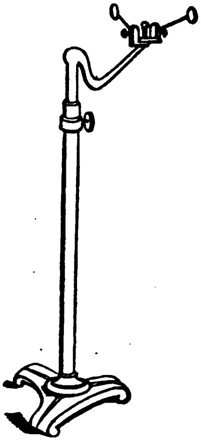

Fig. 35.

HEAD RESTS

For enabling the Sitter to keep the Head in one position without fatigue.

		£	s.	d.
No. 1.	Head Rest of simplest form, for attaching to back of chair	0	2	6
No. 2.	Ditto, with adjustments for raising, depressing, and placing the head piece at any required inclination, for attaching to back of chair (*Fig.* 33)	0	6	6

		£	s.	d.
No. 3.	Bland & Long's Universal Head Rest, with means of adjustment for every position of the sitter, for attaching to chair (*Fig* 34) . .	1	10	0
No. 4.	Universal Head Rest, with heavy iron foot, and brass sliding tube, which enables this rest to be used either for a standing or sitting posture . (*Fig.* 35)	3	3	0

APPARATUS USED IN THE DAGUERREOTYPE.

Under this head are enumerated all the apparatus, materials, and preparations required by the Photographer in operating on Silvered Plates.

DAGUERREOTYPE PLATES, ENGLISH MANUFACTURE.

Size.	Best.			2nd quality.			Size.	Best.			2nd quality.		
	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
2½ by 2	0	12	0	0	12	0	5 by 4	2	5	0	2	3	0
3¼ by 2¾	0	18	0	0	16	0	6½ by 4¾	3	5	0	3	0	0
4 by 3	1	8	0	1	7	0	8½ by 6½	5	10	0	5	0	0
4¼ by 3¼	1	12	0	1	10	0	—	—			—		

PLATES, BEST FRENCH MANUFACTURE.

Size.	40ths.			30ths.			Electro-Plated.		
	£	s.	d.	£	s.	d.	£	s.	d.
2½ by 2	0	3	6	0	4	0	0	5	0
3¼ by 2¾	0	5	6	0	6	0	0	8	6
4 by 3	0	9	0	0	9	0	0	10	6
4¼ by 3¼	0	9	6	0	9	6	0	11	0
5 by 4	0	12	0	0	13	6	0	16	0
6½ by 4¾	0	17	6	0	18	6	1	1	0
8½ by 6½	1	14	0	1	16	6	2	0	0

APPARATUS USED IN DAGUERREOTYPE.

PLATE BOXES.

Each containing grooves for 12 plates.

Size.	Mahogany. £	s.	d.	Walnut Wood. £	s.	d.
2½ by 2 inches.	0	3	0	0	1	4
3¼ by 2¾ "	0	3	6	0	1	6
4 by 3 "	0	4	0	0	1	8
4¼ by 3¼ "	0	4	3	0	1	10
5 by 4 "	0	4	6	0	2	0
6½ by 4¾ "	0	5	6	0	2	6
8½ by 6½ "	0	6	6	0	3	0

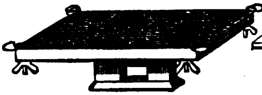

Fig. 36.

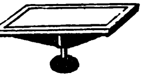

Fig. 37.

PLATE HOLDERS.

Plate Holders, of wood, with brass corners and cramp to fix to table while cleaning or polishing. (*Fig.* 36.)

	£	s.	d.
No. 1. For plates, 2½ by 2 inches . .	0	1	6
No. 2. " 3¼ by 2¾ " . .	0	1	9
No. 3. " 4 by 3 " . .	0	2	0
No. 4. " 4¼ by 3¼ " . .	0	2	3
No. 5. " 5 by 4 " . .	0	2	6
No. 6. " 6½ by 4¾ " . .	0	3	0
No. 7. " 8½ by 6½ " . .	0	3	6

Simple polishing block, for holding the plate while buffing, 1s. 6d. and 2s. 6d.

Metal plate holders, for use with circular buffs in the lathe, or for securing the plate while buffing by hand, of superior make.

(*Fig.* 37.)

	£	s.	d.
For plates, 2½ by 2 inches	0	6	0
" 3¼ by 2¾ "	0	7	0
" 4 by 3 "	0	8	0
" 5 by 4 "	0	10	0
Handle of hard wood, with steel pin for use with ditto	0	1	0

AMERICAN PLATE HOLDER.

Consisting of a strong iron clamp, which firmly secures one edge of the plate, and allows of rigorous use of the buff.

	£	s.	d.
Iron clamp on wood block	0	7	6
Flat iron blocks for plates:—			
No. 1. 2½ by 2 inches	0	2	0
No. 2. 3¼ by 2¾ "	0	2	6
No. 3. 4 by 3 " or 4¼ by 3¼ inches .	0	3	0
No. 4. 6½ by 4¾ "	0	5	0
Apparatus for bending the edges of thin French plates, to prevent injury to the buff	0	7	6
Pliers of an improved form, for bending the corners of plates, and also for holding the plate in drying	0	2	0

Fig. 38.

BUFFS. (*Fig.* 38.)

The materials used in covering these buffs are rendered free from grease and any other impurities naturally existing in them.

BUFFS—CONTINUED.

	Size.	Velvet. £	s.	d.	Doeskin. £	s.	d.
No. 1.	12 by 3 inches.	0	3	0	0	5	0
No. 2.	15 by 3 "	0	4	0	0	6	0
No. 3.	16 by 4 "	0	4	6	0	7	6
No. 4.	9 by 6 "	0	5	0	0	8	0

		£	s.	d.
Best carded cotton wool	per lb.	0	3	0
Hard wood sifting boxes, for containing polishing powders	each	0	1	6

Materials for polishing plates (*see page* 53).

IODINE AND BROMINE PANS.

		£	s.	d.
Porcelain dishes for Iodine or Bromine, with ground glass covers, from		0	2	0
Glass dishes with air-tight covers :—				
4½ by 3½ by 2 inches	each	0	8	6
7 by 5 by 3 "	"	0	12	0
8¾ by 6¾ by 3 "	"	1	2	6

IODINE AND BROMINE BOXES.

Single Iodine or Bromine box, of french polished mahogany, with glass pan, ground glass air-tight cover, and mirror for viewing the plate while under the influence of the vapour :—

	£	s.	d.
For plates 4¼ by 3¼ inches downwards	1	1	0
" 6½ by 4¾ " "	1	10	0
" 8½ by 6½ " "	2	12	9

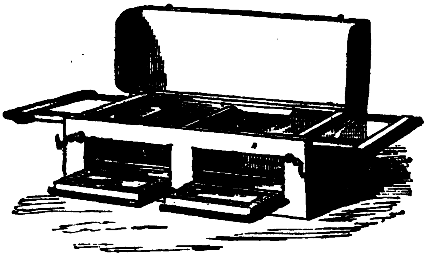

Fig. 39.

COMPOUND IODINE AND BROMINE BOXES.

This form of Bromine box is extremely convenient, as it enables the operator to readily change the plate from the Iodine to the Bromine without exposure, and at the same time to see the colour produced by the vapour.

Compound Iodine and Bromine box, of French-polished mahogany, with glass pans, polished sides, mirrors, and set of frames, &c., complete :— (*Fig.* 39)

	£	s.	d.
For plates 4¼ by 3¼ inches, and under	2	5	0
" 6½ by 4¾ " "	3	0	0
" 8½ by 6½ " "	5	0	0

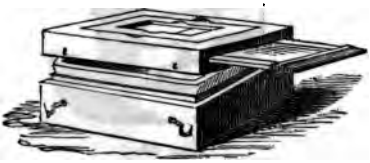

Fig. 40.

Single Iodine or Bromine boxes, French pattern, without mirrors. (*Fig.* 40.)

	Delf pans.		
	£	s.	d.
For ¼ plate size, with set of frames	0	9	0
½ plate " "	0	16	0
whole plate size "	1	0	0

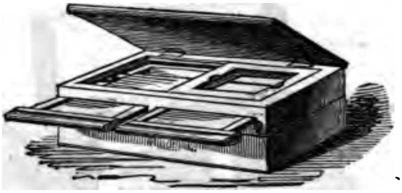

Fig. 41.

Double Iodine and Bromine boxes, French pattern, without mirrors *(Fig. 41.)*

	£	s.	d.
For ¼ plate size, with set of frames	0	18	0
½ plate " "	1	2	6
whole plate size. "	1	7	6

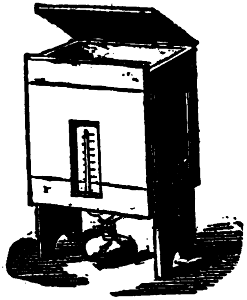

Fig. 42.

MERCURY BOXES.

	£	s.	d.
Mercury Box, French pattern, walnut wood (*Fig.* 42) :—			
No. 1. for plates 4¼ by 3¼ inches . . .	0	8	0
No. 2. " 6½ by 4¾ " . . .	0	12	0
No. 3. " 8½ by 6½ " . . .	0	16	0
Thermometers with ivory scales to mercury boxes, each	0	7	6

	£	s.	d.
Mercury boxes, of improved construction, with window and yellow glass, for viewing the picture during the action of the mercury:—			
No. 1. for plates 4¼ by 3¼ inches	1	1	0
No. 2. " 6½ by 4¾ "	1	7	6
No. 3. " 8½ by 6½ "	1	15	0

MISCELLANEOUS APPARATUS.

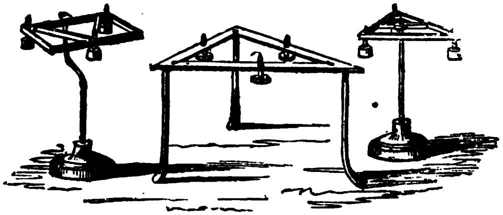

Fig. 43.

	£	s.	d.
Fixing Stands with levelling screws (*Fig* 43):—			
No. 1. for ¼ plate size	0	3	6
No. 2. ½ "	0	5	6
No. 3. whole plate size	0	7	6

Fig 44.

	£	s.	d.
Glass Spirit Lamps, each 1s., 1s. 6d., 2s., 2s. 6d., to	0	5	0

(*Fig.* 44)

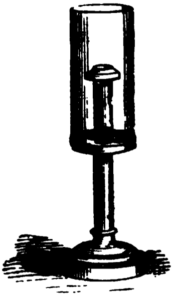

Fig. 47.

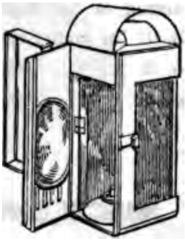

Fig. 45.

	£	s.	d.
Gas Jets, with metal chimney and gauze, with flexible tube for burning off plates without smoke each	0	10	6
Lanterns furnished with yellow glass shades, for use in dark room (*Fig.* 45)	0	4	6
Brass Spirit Lamps . . . . . . from	0	2	6
Porcelain Washing Pans:—			
No. 1 size 5½ by 4½ by 1⅜	0	1	0
No. 2 " 7½ by 6 by 1⅛	0	1	6
No. 3 " 10 by 8 by 1⅝	0	3	6

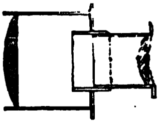

Fig. 46.

	£	s.	d.
Focussing Glasses (*Fig.* 46)	0	8	6
Improved form of Photographic Lamp, where the ruby glass can be raised or depressed (*Fig.* 47) . . .	0	8	6

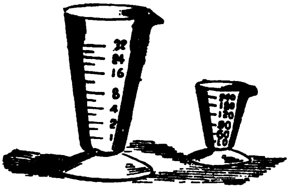

Fig. 48.

GLASS GRADUATED MEASURES. (*Fig.* 48.)

	£	s.	d.		£	s.	d.
1 ounce . .	0	1	3	6 ounce . . .	0	2	4
2 " . .	0	1	4	8 " . .	0	2	9
4 " . .	0	2	0	Minim . . .	0	1	0

		£	s.	d.
Glass Funnels . . .	each 4d., 6d., and	0	1	0
Ditto Syringes	from each	0	0	4
Ditto ditto, graduated	"	0	1	0

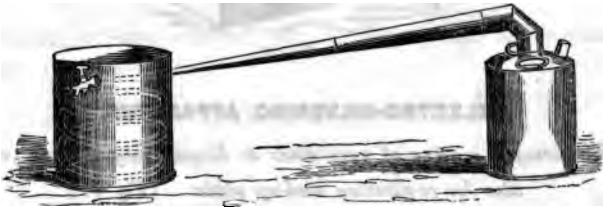

Fig. 49.

STILLS.

It is found very convenient frequently, to have at hand the means of obtaining pure water at a trifling cost; this desideratum is acquired in a very economical way by the use of a small still, which can be placed over a common fire.

	£	s.	d.
Tin Still to hold half a gallon, with worm tub complete, for use over the common fire (*Fig.* 49) . .	0	17	6
Ditto, ditto, one gallon	1	1	0
Ditto, ditto, two ditto	1	7	6
Copper ditto, half ditto	1	10	0
Ditto, ditto, one ditto	2	2	0

Fig. 50.

STILL PACKED FOR TRAVELLING. (Fig. 50.)

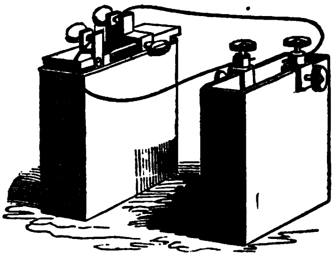

Fig. 51.

ELECTRO-SILVERING APPARATUS.

For giving a coating of pure silver to Daguerreotype plates, and also for re-silvering used-up plates. (*Fig.* 51.)

Smee's Batteries No. 1, 8s. 6d. No. 2, 11s. 6d.

		£	s.	d.
Glass Cells, fitted with binding screws complete:—				
For plates 4¼ by 3¼ inches		0	5	6
Ditto 6½ by 4¾ "		0	7	6
Ditto 8½ by 6½ "		0	15	0
Porcelain Cells, fitted as above:—				
For plates 4¼ by 3¼ inches		0	4	0
Ditto 6½ by 4¾ "		0	6	0
Pure silver foil for the above	per oz.	0	10	0
Argento-Cyanide of Potassium	per pint.	0	10	0
Ditto, ditto, full strength	" oz.	0	1	0

APPARATUS, &c. USED IN THE CALOTYPE

AND OTHER PAPER PROCESSES.

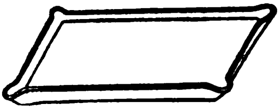

Fig. 52.

Porcelain Pans, with flat bottoms, for preparing and washing paper (*Fig.* 52):—

			£	s.	d.
No. 1.	size 6 by 4½ by 1⅛	inches deep	0	0	8
2.	" 7½ by 6 by 1⅛	"	0	1	6
3.	" 10 by 8 by 1⅛	"	0	2	0
4.	" 8¾ by 6¾ by 1⅛	"	0	1	3
5.	" 10 by 7½ by 1⅛	"	0	1	6
6.	" 11 by 9 by 1⅛	"	0	2	0
7.	" 13 by 11 by 1¼	"	0	4	0
8.	" 15 by 11 by 1½	"	0	5	0
9.	" 20 by 16 by 1½	"	0	17	0
10.	" 22 by 18 by 1½	"	0	21	0
11.	" 8 by 5½ by 1⅛	"	0	1	0

Deep Pans for washing:—

			£	s.	d.
No. 1.	size 9½ by 8½ by 2¼	inches deep	0	2	6
2.	" 10½ by 8½ by 2¼	"	0	2	9
3.	" 11 by 10 by 2¼	"	0	3	0
4.	" 13½ by 11½ by 2½	"	0	6	0
5.	" 14½ by 12½ by 2½	"	0	8	0
6.	" 16 by 12½ by 2½	"	0	9	6
7.	" 19½ by 14½ by 2¼	"	0	15	0
8.	" 23½ by 18 by 3	"	1	5	0

Glass Dishes with polished bottoms and edges for preparing waxed or Calotype papers. The advantage possessed by these dishes is, that they are entirely unacted upon by the chemicals employed, and therefore can be used for different solutions one after another, without risk of the admixture which is so likely to take place when the pans are of porcelain.

			£	s.	d.
No. 1.	Inside measurement,	7 by 5½ inches	0	6	0
2.	"	9½ by 7½ "	0	11	0
3.	"	10½ by 8¼ "	0	15	0
4.	"	11½ by 9½ "	0	17	6
5.	"	13 by 11 "	1	5	0

GUTTA PERCHA WASHING TRAYS.

	£	s.	d.
No. 1. Nest of three Gutta Percha Trays:— Size of largest 10 by 8 by 1¾ inches . . .	0	9	0
No. 2. Nest of three Gutta Percha Trays:— Size of largest 11 by 9 by 1¾ inches . . .	0	12	0

Gutta Percha Pans, of very superior finish, with perfectly flat and polished bottoms.

			£	s.	d.
No. 1.	size	12½ by 10½ inches . .	0	8	0
2.	"	12 by 10 " . .	0	6	6
3.	"	11½ by 9½ " . .	0	5	6
4.	"	11 by 9 " . .	0	4	0
Or nest of four of above sizes			1	1	0
5.	"	19¼ by 14¼ by 2 inches .	1	0	0

GUTTA PERCHA FUNNELS.

Gutta Percha Funnels, each 6d., 8d., 1s. 3d., 1s. 6d., and 2s.

Gutta Percha Dipping Troughs. (*See page* 42.)

Glass Rods for the spreading of solutions on paper, each 4d., 6d. and 0 1 0

Boards for the preparation of paper.—

			s.	d.
No. 1.	For paper	7 by 6 inches .	1	0
No. 2.	"	8 by 7 " . .	1	3
No. 3.	"	10 by 8 " . .	1	6
No. 4.	"	11 by 9 " . .	2	0

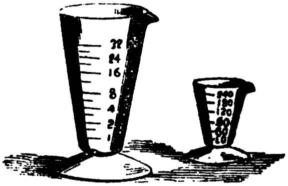

Fig. 54.

Fig. 55.

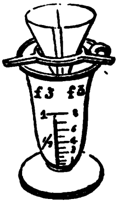

Fig. 56.

Glass Graduated Measures, (*Fig.* 54,) accurately divided.

	s.	d.		s.	d.
Contents 1 ounce . .	1	3	Contents 8 ounces . .	2	9
" 2 ounces . .	1	4	" 20 oz. cylindrical	3	6
" 4 " . .	2	0	Minim measure, 120 drps	1	0
" 6 " . .	2	4	" 240 "	1	0

GLASS FUNNELS,

Ribbed inside, for filtering. (*Fig.* 55.)

		s.	d.
No. 1.	2 inches diameter . . .	0	4
No. 2.	2½ " . . .	0	5
No. 3.	4 " . . .	0	6
No. 4.	5 " . . .	0	8
No. 5.	6 " . . .	1	0
No. 6.	7 " . . .	1	4

Funnels, Wedgwood, cream colour, ribbed inside:—

		s.	d.
No. 1.	2 inches diameter . . .	0	5
No. 2	3½ " . . .	0	8
No. 3.	4 " . . .	0	10
No. 4.	5 " . . .	1	4
No. 5.	6 " . . .	2	0
No. 6.	6½ " . . .	2	6

Filter Holders, (*Fig.* 56,) very useful for filtering small quantities of liquid . . . each 3d., 6d., and 8d.

Glass Syringes, for taking up definite quantities of solutions. Plain, from 4d.; Graduated, from 1s.

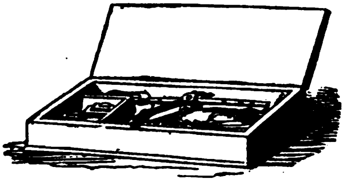

Fig. 57.

SCALES AND WEIGHTS.

		£	s.	d.
No. 1.	In oak box, metal pans	0	3	0
No. 2.	Ditto "	0	5	0
No. 3.	Ditto glass pans (*Fig.* 57)	0	7	0
No. 4.	Mahogany box "	0	12	0
No. 5.	Ditto, with brass pillar and glass shifting pan, with drawer	2	2	0

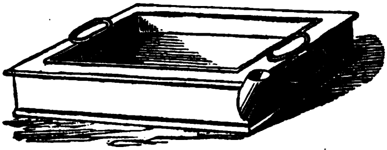

Fig. 58.

	£	s.	d.
Double Tin Dish for Waxing Paper, (*Fig.* 58,) very convenient	0	12	6
Ditto, ditto, with plated inner dish	1	5	0

Horn Forceps, for manipulating with waxed paper, (*Fig.* 59,) 1s. each.

Fig. 59.

CAMEL'S HAIR BRUSHES,

Made expressly for Calotype.

	s.	d.		s.	d.
1¼ inches broad, each	1	6	3 inches broad, each	2	6
2 " "	1	9	4 " "	3	6
2½ " "	2	3	5 " "	4	6
Thick round ditto			each, 1s., 1s. 6d. and	2	0

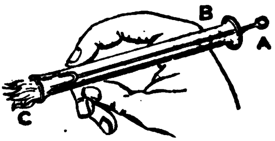

Fig. 60.

	£	s.	d.
Buckle's Brushes (*Fig.* 60,) for spreading solutions, each	0	2	0

PHOTOGRAPHIC PAPER.

As much of the success of the Calotype, waxed paper, and other paper processes depends on the nature of the material on which the sensitive compound is spread, a careful selection of papers from the most eminent makers has been made, combining fineness of surface and evenness of texture, with a proper tenacity to allow of the necessary washings to which the paper is exposed in the various manipulations.

		Per quire. £	s.	d.
Canson Fréres, size 22½ by 17½ inches	Negative	0	3	0
	Positive	0	4	0
Whatman's, or Hollingsworth's, size 19 by 15 inches	Negative	0	3	0
	Positive	0	3	0
Turner's patent Talbotype, size 15 by 9 inches	Negative	0	2	6
	Positive	0	1	6
German paper, size 22½ by 17½ inches	Negative	0	3	0
	Positive	0	4	0
Bland & Long's Waxed paper, prepared with great care, size 17½ by 11 inches		0	7	0
Bland & Long's Iodized Waxed paper, size 17½ by 11 in.		0	15	0

Bland & Long's Iodized paper,

Size 7 by 6 inches,	3s.	dozen	Size 10 by 8 inches,	8s.	dozen
9½ by 7½ "	5s.	"	15 by 12 "	12s.	"

		£	s.	d.
White Bibulous paper, prepared free from iron or other impurities	per quire	0	1	3
Papier Joseph	"	0	1	0
Solution for Iodizing paper, for Calotype,	per ounce	0	1	6
" " Waxed paper	per pint	0	5	0
" for rendering the above sensitive	"	0	8	0

BLAND & LONG'S ALBUMENIZED PAPER,

For printing from Glass or Paper Negatives.

The great superiority of the definition obtained by this method of printing over that of the ordinary process, renders it necessary that all pictures—where great minuteness of detail is essential to their successful effect—should be printed on Albumenized paper. It is easily rendered sensitive, and being prepared with Salts of Baryta will give every colour and tone from a sepia to a perfect black.

		£	s.	d.
Size 22½ by 17½ inches . . .	per quire	0	14	0
17½ by 11 " . . .	"	0	7	0
11 by 9 " . . .	"	0	3	6

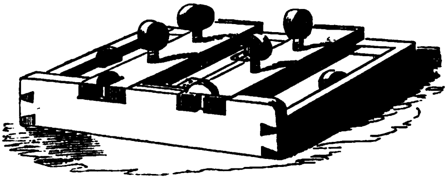

Fig. 61.

REVERSING OR PRINTING FRAMES.

These frames are so constructed, that a uniform pressure may be obtained, thus insuring perfect contact between the positive and negative papers. The back boards of these frames are so arranged, that the progress of the picture may be watched without danger of shifting the papers.

Reversing Frames in French-polished Mahogany (*Fig.* 61):—

		£	s.	d.
No. 1.	For pictures, 7 by 6 inches .	0	10	0
2.	" 9 by 7 " .	0	12	6
3.	" 10 by 8 " .	0	15	0
4.	" 12 by 10 " .	1	1	0
5.	" 14 by 12 " .	1	7	6

Reversing Frames in White Wood, hinged backs for viewing progress of picture :—

				£	s.	d.
No. 1.	size of glass,	6 by 5	inches	0	5	6
2.	"	7¾ by 6¼	"	0	7	0
3.	"	10½ by 8	"	0	8	0
4.	"	11½ by 9½	"	0	12	0

APPARATUS USED FOR THE COLLODION AND ALBUMEN PROCESSES.

In the following list will be found all the necessary materials and apparatus for use in both the Collodion and Albumenized Glass processes, together with forms of Focimeter for determining the chemical foci of Lenses.

Glass Plates, with ground edges, best patent plate, free from specks

		PER DOZ. s.	d.			PER DOZ. s.	d.
Size 3¼ by 2¾	inches	1	3	Size 7 by 6	inches	5	3
" 4 by 3	"	1	6	" 8½ by 6½	"	6	6
" 4¼ by 3¼	"	1	9	" 9 by 7	"	7	6
" 5 by 4	"	2	3	" 10 by 8	"	11	6
" 6 by 5	"	3	6	" 12 by 10	"	17	0
" 6½ by 4¾	"	3	6				

Fig. 62.

Boxes for holding **Glass Plates,** White Wood, with grooves for One Dozen Plates (*Fig.* 62) :—

BOXES FOR GLASS PLATES.

		s.	d.
No. 1.	size 3¼ by 2¾ in.	1	6
2.	" 4 by 3 "	1	8
3.	" 4¼ by 3¼ "	1	8
4.	" 5 by 4 "	2	0
5.	" 6½ by 4¾ "	2	6
No. 6.	size 6 by 5 in.	2	3
7.	" 7 by 6 "	3	0
8.	" 8½ by 6½ "	3	6
9.	" 9 by 7 "	4	0
10.	" 10 by 8 "	5	0

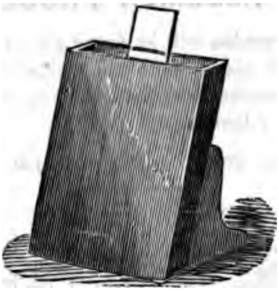

Fig. 63.

GUTTA PERCHA DIPPING BATHS.

Inclined, with bracket supports, and glass dippers (*Fig.* 63):—

		£	s.	d.
No. 1.	size, for plates 4 by 3 inches .	0	2	6
2.	" 5 by 4 " .	0	3	6
3.	" 6 by 5 " .	0	4	6
4.	" 8½ by 6½ " .	0	7	0
5.	" 9 by 7 " .	0	10	6
6.	" 10 by 8 " .	0	11	0
7.	" 12 by 10 " .	0	17	6
8.	" 14 by 12 " .	1	2	6
9.	*for* Stereoscopic plates . .	0	3	6

Glass Dipping Baths, fitted in Mahogany stands, with glass dippers:—

	£	s.	d.
No. 1. size, for plates 4 by 3 inches .	0	3	0
2. “ 5 by 4 “ .	0	4	0
3. “ 6 by 5 “ .	0	6	0
4. “ 8½ by 6½ “ .	0	17	6

Glass Dippers, for plunging the plates into the Bath of Nitrate of Silver:—

	£	s.	d.
No. 1. size, for plates 5 by 4 inches .	0	0	6
2. “ 7 by 6 “ .	0	1	0
3. “ 10 by 8 “ .	0	1	6
4. “ 12 by 10 “ .	0	2	0

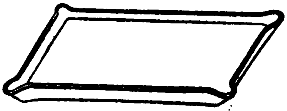

Fig. 64.

Porcelain Pans for washing (*see page* 35).

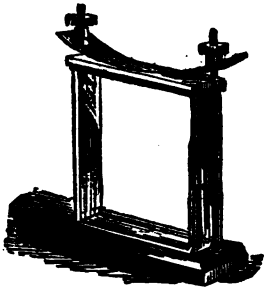

Fig. 65.

Water-tight Baths, in Glass and Gutta Percha (*Fig.* 65).

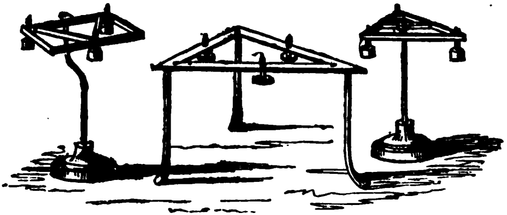

Fig. 67. *Fig.* 68. *Fig.* 66.

LEVELLING STANDS,

With adjusting Screws, for laying plates with Albumen, and developing Collodion pictures.

No.	Size		s.	d.
No. 1.	size, for plates up to 5 by 4 inches	(*Fig.* 66)	3	6
2.	" " 7 by 6 "	(*Fig.* 67)	5	0
3.	" " 9 by 7 "	(*Fig.* 67)	7	6
4.	" " 12 by 10 "	(*Fig.* 68)	8	6

Fig. 70.

Fig. 69.

PLATE HOLDERS.

	£	s.	d.
Pneumatic Plate Holder, simple form (*Fig.* 69) .	0	1	0
Ditto, ditto	0	2	0
Ditto, ditto, large, with lever (*Fig.* 70) . . .	0	4	6

Fig. 71.

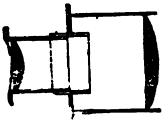

Fig. 72.

	£	s.	d.
Photographic Visnometer, (*Fig.* 71) for enabling the tourist to judge of the effect of a landscape, folding for the pocket	0	3	6
Focussing Glass or Eye-piece, for obtaining a perfectly sharp and distinct picture on the focussing screen (*Fig.* 72) . . . . . . 7s. 6d. and	0	14	0
Instrument to count Seconds, with Alarum . . .	3	0	0
Ditto, ditto, **without Alarum**	1	5	0
Scales and Weights (*See page* 38).			

BLAND AND LONG'S VARNISH.

	£	s.	d.
For protecting the Collodion picture from injury during printing . . . . . . per ounce,	0	0	4

This varnish is a most perfect protection and is easily applied; it possesses the qualities of extreme hardness, transparency, and rapidity of drying in the highest degree.

	£	s.	d.
Filter Rings, useful in filtering small quantities of liquids . . . . . each, 3d., 6d., and	0	0	8
Glass Graduated Measures (*See page* 37)			
Claudet's Focimeter, for ascertaining the amount of separation existing between the optical and chemical foci of lenses	1	10	0
Bland & Long's form of Focimeter	1	1	0

PHOTOGRAPHIC COLOURS,

For colouring Photographs on Plate or Collodion.

	£	s.	d.
No. 1. Box containing 7 colours, with gold and silver shells, brushes, &c.	0	7	6
No. 2. Ditto, containing 14 colours, gold and silver shells, and an assortment of brushes . . .	0	10	6
No. 3. Ditto, containing 21 colours, ditto . . .	0	15	0
Separate colours of all tints . . per bottle	0	1	0
Camel's-hair Brushes . . . . per dozen	0	1	0
Sable ditto . . . . "	0	8	0

Elastic Bottle, for removing dust from plate, No. 1, 2s. 6d., No. 2, 3s. 6d., No. 3, 4s. 6d.

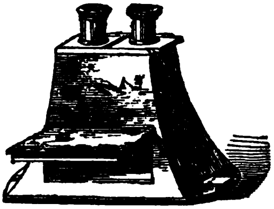

Fig. 73.

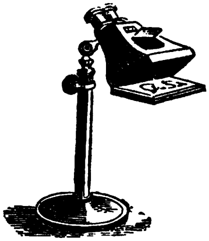

Fig. 75.

STEREOSCOPES, AND STEREOSCOPIC PICTURES.

Stereoscopes are of two kinds, namely, the Reflecting Stereoscope of Professor Wheatstone, and the Lenticular or Refracting one of Sir David Brewster (*Fig.* 73). They both possess the power, as their name implies, of exhibiting objects properly prepared as solids; that is to say, precisely as we see them in nature, having three dimensions—length, breadth, and thickness.

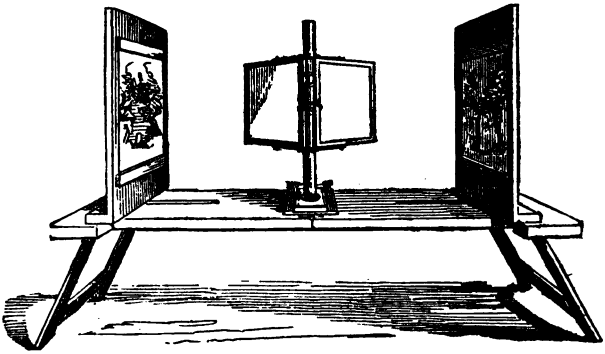

Fig. 74.

The Reflecting Stereoscope (*Fig.* 74) is best adapted to the display of large pictures and views; while the Lenticular one is most suited for the exhibition of portraits, architectural subjects, still life, groups of statuary, and such objects which do not suffer by being reduced to pictures of small size.

One of the most beautiful applications of Photography is, the taking of pictures fitted for the Stereoscope; in fact, this is the *only really correct* means by which we can obtain them.

DESCRIPTION OF THE PHENOMENA PRODUCED BY THE STEREOSCOPE.

The Stereoscope is an instrument which was originally designed, but in a different form from that now generally used, by Professor Wheatstone, for the purpose of demonstrating the theory of binocular vision, or, in other words, of exhibiting the effects and advantages of having two eyes.

The name is derived from two Greek words signifying to view solid things, and the instrument is so constructed that two flat pictures, taken under certain conditions, shall appear to form a single solid or projecting body.

The effects are so striking, and seem so opposed to the evidence of our senses, that the most casual observer immediately seeks a solution of the mystery. As, however, the phenomena cannot be comprehended without some knowledge of the science of optics, a few general principles will be stated in as familiar a manner as the subject will admit.

All bodies are rendered visible by the light which radiates from every point of their surfaces, each ray of light carrying with it the image of the object from which it emanated. These rays are refracted by the crystalline lens and other humours of the eye; and are brought to a focus so as to form a picture of the object, upon a delicate expansion of the optic nerve termed the retina, which picture is precisely similar to that formed by the lens in the ordinary camera obscura. The impressions thus produced are conveyed to the brain or sensorium by the optic nerves; so that the eye does not see, but is merely the instrument by means of which the mind perceives external objects while the judgment derived from experience determines their shapes and distances.

A picture of an object is formed on the retina of each eye, but although there may be but one object presented to the two eyes, the pictures formed on the two retinæ are not precisely alike, because the object is not observed from the same point of view.

If the finger be held at a distance of six or eight inches from the eyes, it will be obvious that it can only be seen by rays diverging from the finger, as no others would enter the eyes. And if we bend a card so as to represent a triangular roof, place it on the table with the gable end towards the eyes, and look at it, first with one eye and then with the other, quickly and alternately opening and closing one of the eyes, the card will appear to move from side to side, because it is seen by each eye under a different angle of vision. If we look at the card with the left eye only, the whole of the left side of the card will be plainly seen, while the right side will be thrown into shadow. If we next look at the same card with the right eye only, the whole of the right side of the card will be distinctly visible, while the left side will be thrown into shadow; and thus *two* images of the same object, with *differences of outline, light, and shade* will be formed, the one on the retina of the right eye, and the other on the retina of the left. These images falling on corresponding parts of the retinæ convey to the mind the impression of a single object, while experience having taught us, however unconscious the mind may be of the existence of two different images, that the effect observed is always produced by a body which really stands out or projects, the judgment naturally determines the object to be a projecting body.

It is experience also that teaches us to judge of distances by the different angles of vision under which an object is observed by the two eyes, for the inclination of the optic axes when so adjusted that the images may fall on corresponding parts of the retinæ, and thus convey to the mind the impression of a single object, must be greater or less according to the distance of the object from the eyes.

Perfect vision cannot then be obtained without two eyes, as it is by the combined effect of the image produced on the retina of each eye, and the different angles under which objects are observed, that a judgment is formed respecting their solidity and distances.

A man restored to sight by couching cannot tell the form of a body without touching it, until his judgment has been matured by experience, although a perfect image may be formed on the retina of each eye. A man with only one eye cannot readily distinguish the form of a body which he had never previously seen, but quickly and unwittingly moves his head from side to side, so that his one eye may alternately occupy the different positions of a right and left eye; and, if we approach a candle with one eye shut, and then attempt to snuff it, we shall experience more difficulty than we might have expected, because the usual mode of determining the correct distance is wanting.

In order, then, to deceive the judgment, so that flat surfaces may represent solid or projecting figures, we must cause the different images of a body, as observed by the two eyes, to be depicted on the respective retinæ, and yet to appear to have emanated from one and the same object. Two pictures are therefore taken from the really projecting or solid body, the one as observed by the right eye only, and the other as seen by the left. These pictures are then placed in the box of the Stereoscope, which is furnished with two eye-pieces containing lenses so constructed that the rays proceeding from the respective pictures, to the corresponding eye-pieces, shall be refracted or bent outwards, at such an angle as each set of rays would have formed had they proceeded from a single picture in the centre of the box to the respective eyes, without the intervention of the lenses; and as it is an axiom in optics that the mind always refers the situation of an object to the direction from which the rays appear to have proceeded when they enter the eyes, both pictures will appear to have emanated from one central object; but as one picture represents the real or projecting object as seen by the right eye, and the other as observed by the left, though appearing by refraction to have proceeded from one and the same object, the effects conveyed to the mind, and the judgment formed thereon, will be precisely the same as if the images were both derived from *one solid or projecting body*, instead of from *two pictures*, because all the usual conditions are fulfilled; and consequently the two pictures will appear to be converted into one solid body.

The necessary pictures for producing these effects, excepting *those of geometrical* figures, which may be laid down by certain rules, cannot, however, be drawn by the hands of man, for, as Professor Wheatstone has observed, "It is evidently impossible for the most accurate and accomplished artist to delineate, by the sole aid of his eye, the two projections necessary to form the stereoscopic relief of objects as they exist in nature with their delicate differences of outline, light, and shade. But what the hand of the artist was unable to accomplish, the chemical action of light, directed by the camera, has enabled us to effect."

Daguerreotype portraits and Talbotype pictures are therefore taken, usually by two Cameras placed towards the object, with a difference of angle equal to the difference of the angle of vision of the two eyes, which is about 18° when the object is eight inches from the eyes; hence, if these be carefully examined and compared with the original projecting objects, they will be found to be faithful representations of the object as seen by each eye respectively.

DIRECTIONS FOR USING THE STEREOSCOPE.

The objects must be so adjusted in the box that only one picture may be seen in the centre, care being taken that the pictures are not reversed so as to be seen by the right eye instead of the left, and vice versâ.

The proper position of portraits, buildings and similar objects, cannot be mistaken, but where this is not readily perceived, it should be ascertained, when the object can be marked so as at once to be properly placed.

The eye-pieces, if allowed to turn, are marked with arrows to indicate their proper position; these must be placed inwards, and in a right line with each other.

The eye-pieces are made to draw out to suit the foci of different persons. Those who use spectacles will generally see best with them on, bringing them forward *so as to lie flat on the eye-pieces*, which, in such cases, should not be drawn out.

	£	s.	d.
Reflecting Stereoscope for large views	2	10	0
Ditto, ditto, superior construction (*Fig* 74) . .	4	4	0
Refracting Stereoscope, in Japanned Tin, with diagrams each	0	3	0
Ditto, ditto, (*Fig* 73,) in mahogany, with Brass Eye-pieces . . . . 7s. 6d. and	0	10	0
Ditto, ditto, rosewood	0	14	0
Ditto, ditto, " superior, with Ivory Eye-pieces	1	1	0
Ditto, ditto, in mahogany, very superior, with Brass Eye-pieces, adapted for hot climates	0	18	0
Ditto, ditto, mounted on brass adjusting stand suitable for the table (*Fig*. 75)	1	15	0
Brass Stand for Stereosc . . from	0	15	0

STEREOSCOPIC PICTURES.

Messrs. Bland and Long would take occasion to remark, that a great difference exists in the quality of pictures suited to the Stereoscope, the prices of those only which are highly satisfactory as works of art being detailed in the following list:—

Daguerreotype Pictures for Stereoscopes, each 5s., 6s , &	0	10	0
Views and Subjects on paper, each 1s., 2s., and	0	3	0
Transparent Albumen Pictures on Glass, including views in all parts of the globe, 4s., 5s., 7s. 6d., 9s., &	0	10	0
Large Views on paper for reflecting Stereoscopes, per pr.	0	12	0

Messrs. Bland and Long are continually adding new subjects to their stock of Stereoscopic Pictures.

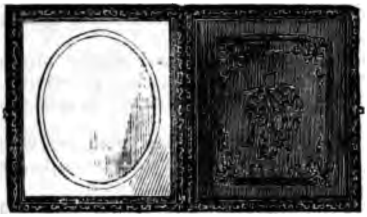

Fig. 76.

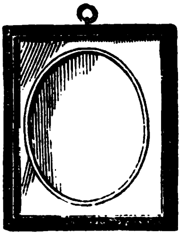

Fig. 77.

MOROCCO CASES,

With Gilt Mats.

Morocco Cases, fitted with Glasses and Gilt Mats of three shapes—dome, oval, and cushion, of very superior quality, for finished pictures (*Fig.* 76) :—

					£	s.	d.
No. 1.	size, for plates	2½ by 2	inches	per doz.	0	10	0
2.	" "	3¼ by 2¾	"	"	0	16	0
3.	" "	4 by 3	"	"	1	2	0
4.	" "	4¼ by 3¼	"	"	1	4	0
5.	" "	5 by 4	"	"	1	15	0
6.	" "	6½ by 4¾	"	"	2	10	0
7.	" "	6 by 5	"	"	2	10	0
8.	" "	8½ by 6½	"	"	5	0	0

MOROCCO FRAMES,

With Suspensory Rings, Mats, and Glasses. (*Fig.* 77.)

					£	s.	d.
No. 1.	size, for plates	2½ by 2 inches	.	per doz.	0	7	0
2.	“ “	3¼ by 2¾ “	.	“	0	9	6
3.	“ “	4 by 3 “	.	“	0	10	6
4.	“ “	4¼ by 3¼ “	.	“	0	12	6
5.	“ “	5 by 4 “	.	“	1	0	0
6.	“ “	6½ by 4¾ “	.	“	1	10	0
7.	“ “	8½ by 6½ “	.	“	3	0	0

GILT MATS,

Of superior quality, oval, dome, and cushion shapes.

					£	s.	d.
No. 1.	size, for plates	2½ by 2 inches	.	per doz.	0	0	8
2.	“ “	3¼ by 2¾ “	.	“	0	1	0
3.	“ “	4 by 3 “	.	“	0	1	3
4.	“ “	4¼ by 3¼ “	.	“	0	1	6
5.	“ “	5 by 4 “	.	“	0	2	9
6.	“ “	6½ by 4¾ “	.	“	0	5	6

PRESERVERS.

These frames are composed of thin gilt metal, having a beading on the edge; their use is to keep the glass, mat, and picture in close contact, to the exclusion of dust, &c.

					£	s.	d.
No. 1.	size, for plates	2½ by 2 inches	.	per doz.	0	0	9
2.	“ “	3¼ by 2¾ “	.	“	0	0	10
3.	“ “	4¼ by 3¼ “	.	“	0	1	8
4.	“ “	5 by 4 “	.	“	0	3	0
5.	“ “	6½ by 4¾ “	.	“	0	4	6

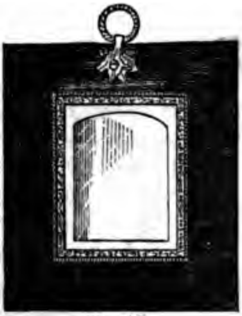

Fig. 78.

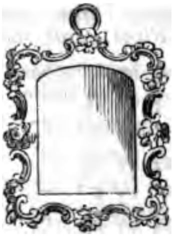

Fig. 79.

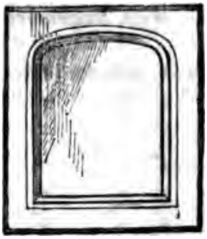

Fig. 80.

BLACK PAPIER MACHE FRAMES,

Very elegant, with Gilt Rim and Suspension Ring. (*Fig.* 78.)

No.	Size		£	s.	d.
No. 1.	size, for plates 2½ by 2 inches .	each	0	2	6
2.	" " 3¼ by 2¾ " .	"	0	3	0
3.	" " 4¼ by 3¼ " . .	"	0	4	0
4.	" " 5 by 4 " .	"	0	4	6

ORMOLU FRAMES,

With Gilt Mats and Glasses. (*Fig.* 79.)

No.	Size		£	s.	d.
No. 1.	size, for plates 2½ by 2 inches .	each	0	1	6
2.	" " 3¼ by 2¾ " .	"	0	2	0
3.	" " 4¼ by 3¼ " .	"	0	3	0
4.	" " 5 by 4 " .	"	0	5	0
5.	" " 6 by 5 " .	"	0	10	0

PASSE PARTOUTS,

For Daguerreotype, Glass, or Paper Portraits and Views. (***Fig.*** **80.**)

	Inches.	Dark ground. s.	Dark ground. d.	White & gold. s.	White & gold. d.	Dead gold. s.	Dead gold. d.	Card-board. s.	Card-board. d.
No. 1.	For plates, 2½ by 2 per doz.	2	0	3	0	7	9		
2.	" 3¼ by 2¾ "	2	6	3	9	8	6		
3.	" 4¼ by 3¼ "	3	3	4	6	9	6	7	6
4.	" 5 by 4 "	5	6	7	6	15	0	9	0
5.	" 6½ by 4¾ "	6	9	9	6	20	0	10	6
6.	" 8½ by 6½ "	12	0	18	0	42	0	16	0

Gutta Percha Frames **to order.**

PURE CHEMICALS AND PREPARATIONS

Used in the Photographic Processes.

Messrs. Bland & Long feel great confidence in submitting the following list of Chemicals, &c., to the notice of Photographers, as being of the first quality and of perfect purity.

DAGUERREOTYPE.

		£	s.	d.
Bromine, in 1 ounce bottles		0	2	6
" Solution	per ounce	0	0	4
" Chloride, prepared for use	"	0	0	6
Bromide of Lime	per bottle	0	2	6
" Iodine	per ounce	0	1	0
Chloro-bromide of Lime	per bottle	0	3	6
Charcoal, prepared, for polishing plates	per packet	0	1	0
Cotton wool, best per ounce 3d.,	per pound	0	3	0
Gold, Chloride, in bottles	¼ dram	0	3	0
" "	½ "	0	5	0
" "	1 "	0	8	6
" "	2 "	0	17	0
Gold, Salt of (Sel d'or)	per bottle	0	3	9
Iodine, pure, re-sublimed (variable)	per ounce	0	2	0
" Commercial	"	0	1	6
" Tincture	"	0	0	6
" Chloride	"	0	3	0
Lime, Bromide	per bottle	0	2	6
" Iodide	"	0	2	6
Lamp Black, prepared for buffing	per packet	0	1	0
Mercury, pure distilled per ounce 3d.,	per pound	0	2	6
Naphtha, for lamp	per pint	0	1	0
Rottenstone, prepared, for polishing	per ounce	0	0	6
Rouge	"	0	0	6
Sensitive Solution	per bottle	0	2	6
Silver Solution (Argento-cyanide of Potassium), for re-silvering Daguerreotype plates	per ounce	0	1	0
Soda, Hyposulphite, pure, per pound 8d.,	"	0	0	1
Tripoli, prepared, for polishing	"	0	0	6
Water, distilled	per gallon	0	0	6

CALOTYPE AND PAPER PROCESSES.

Acid, Acetic Glacial, pure	per ounce	0	1	0
" Gallic	"	0	1	6
" Succinic	"	0	5	0
Ammonia, pure	"	0	0	2
" Muriate, free from iron	"	0	0	3
Ammonium, Iodide (variable)	"	0	2	8
Barium, Chloride	"	0	0	2

		£	s.	d.
Barium, Iodide (variable)	per ounce	0	4	0
Gold, Chloride	per dram	0	8	6
“ Solution, for darkening positives	per ounce	0	0	6
Iron, Protosulphate, pure	“	0	0	1
“ Iodide (variable)	“	0	2	0
Potassium, Bromide, pure (variable)	“	0	2	0
“ Cyanide	“	0	0	4
“ Iodide (variable)	“	0	2	0
“ Ferrocyanate (yellow prussiate)	“	0	0	4
“ Ferridcyanide (red prussiate)	“	0	0	6
“ Fluoride	“	0	2	0
Silver, Nitrate, crystallized	“	0	4	0
“ “ fused	“	0	4	6
“ Ammonio-nitrate	“	0	1	0
“ Iodide	“	0	6	0
“ “ in Iodide of Potassium	“	0	1	6
Soda, Hyposulphite . per pound 8d.,	“	0	0	1
Sodium, Chloride, pure	“	0	0	3
“ Fluoride	“	0	1	0
Sugar of Milk	“	0	0	3
Solution for iodizing waxed paper	per pint	0	5	0
“ rendering “ sensitive	“	0	9	0
White Wax	per pound	0	3	0

COLLODION AND ALBUMEN GLASS PROCESSES.

Acid, Acetic Glacial	per ounce 6d. and	0	0	4
“ Pyrogallic, pure	per ounce 8s., per dram	0	1	0
“ Sulphuric, pure	per ounce	0	0	2
“ “ common	per pound	0	0	3
Ammonia, pure	per ounce	0	0	2
Ammonium, Iodide (variable)	“	0	3	6
Barium, Iodide	“	0	4	0
Baryta, Nitrate, pure	“	0	0	3
Collodion	“	0	0	8
“ Iodized	“	0	0	9
Æther, Sulphuric, rectified	“	0	0	6
Iron, Protosulphate, pure	“	0	0	1
“ Protonitrate, solution	“	0	0	3
“ Iodide (variable)	“	0	2	0
Potassa, Nitrate, powdered	per pound	0	1	0
Potassium, Iodide (variable)	per ounce	0	2	0
Silver, Nitrate, crystallized	“	0	4	0
“ “ fused	“	0	4	6
“ Iodide	“	0	6	0
Soda, Hyposulphite . per pound 8d.,	“	0	0	4
Varnish for protecting glass pictures	“	0	0	1

The foregoing prices are subject to variation.

BLAND & LONG'S

IODIZED COLLODION,

Price 9d. per ounce.

This valuable preparation for sensitiveness and uniformity of action is unsurpassed.

The COLLODION and IODIZING SOLUTION can be obtained separate, in which state they will keep for an indefinite period, and can be exported to any climate without risk of deterioration.

Price of Collodion, in pint bottles, 12*s.* 6*d.; Iodizing Solution, for one pint,* 4*s.* 6*d.; making* 27 *ounces Iodized Collodion* 17*s.*

NITRATE OF SILVER BATH,

FOR BLAND & LONG'S COLLODION,

Ready for immediate use.—*Price 7s. 6d. per pint.*

BLAND & LONG'S

BENZOIN VARNISH,

FOR PROTECTING COLLODION PICTURES.

Price 1s. per ounce.

This Varnish does not require the plate to be warmed, but dries instantly, leaving a perfectly hard transparent coating on the picture.

LIQUID JET,

For applying to the back of Collodion Positives, giving great brilliancy and lustre to the Pictures.—*Price in 4 oz. bottles, 6d.; 8 oz. ditto, 1s.*

BLAND & LONG'S

POSITIVE TONING BATH,

For giving rich tones and colour to Positive Photographs, printed on either Plain or Albumenized Papers.—*Price 5s. per pint.*

BLAND & LONG'S

SILICA SOAP,

A powerful detersive Agent for the speedy removal of Photographic Stains.—*Price in pots, 1s., 2s., and 3s, each, secured by a green label with name and address.*

ESTIMATES

OF

Complete Sets of Photographic Apparatus.

FOR THE COLLODION PROCESS ONLY.

		£	s.	d
No. 1.	**Complete Set of Photographic Apparatus,** for taking positive portraits and views up to 4¼ by 3¼ inches, in wood case, complete, with tripod stand	3	0	0

This apparatus is of the most simple kind, and consists of a compound achromatic lens (tested); walnut camera and back; 2 plate holders and focussing screen; mahogany tripod stand; scales and weights; porcelain pan; gutta percha bath and dipper; filtering paper; glass funnel; graduated measure; 1 dozen plates in box; and bottles containing 6 oz. of nitrate of silver bath, 3 oz. positive collodion, 1 pint of developing solution, 1 oz. cyanide potassium, 1 oz. of Bland and Long's transparent varnish, with full directions for use.

		£	s.	d
No. 2.	**Complete Set of Photographic Apparatus,** for taking portraits up to 6½ by 4¾, the contents of box being the same as No. 1, only in larger quantities	5	5	0
No. 3.	**Complete Set of Photographic Apparatus,** for taking portraits and views 4¼ by 3¼ inches; consisting of a sliding body camera, in walnut wood; 1 single back, for plates 4¼ by 3¼ inches, fitted with compound achromatic lens of superior construction; reversing frame; glass plates in box; gutta percha bath and dipper; porcelain pan; levelling stand; scales and weights; glass graduated measure; filtering paper and funnel; Canson's positive paper, for printing; camera tripod stand; and chemicals, consisting of 1 oz. nitrate of silver, ½ dram of pyrogallic acid, 1 oz. glacial acetic acid, 4 oz. iodized collodion, hyposulphite of soda, 1 oz. varnish; the whole packed in case, with lock and handle	5	5	0
No. 4.	**Complete Set of Photographic Apparatus,** for portraits. 4¼ by 3¼ inches, same as No. 3, but with best French-polished mahogany camera, and compound achromatic lens, of Bland and Long's own make, in which the chemical and optical foci are warranted to coincide; chemicals, stand, *&c., complete*	7	7	0

		£	s.	d.
No. 5.	**Complete Set of Photographic Apparatus,** consisting of sliding body camera of superior construction, with dark slide and loose frames for plates 5 by 4 inches, and 4 by 3 inches; Compound achromatic lens, mounted in handsome brass front, of Bland and Long's own make, the chemical and optical foci being perfectly coincident; glass plates; plate boxes; gutta percha bath and dipper; washing pan; levelling stand; reversing frame; glass measures; scales and weights, with glass pans; with all the necessary chemicals, papers, tripod stand, &c., packed in case, complete, with lock and key . . .	10	10	0
No. 6.	**Complete Set of Photographic Apparatus,** consisting of sliding body camera, best make; dark slide, with 3 loose frames for plates 6 by 5 inches, 5 by 4 inches, and 4 by 3 inches, fitted with Compound achromatic lens, mounted in handsome brass front, of Bland and Long's own make, the chemical and optical foci being absolutely coincident; glass plates; 3 plate boxes; gutta percha bath and dipper; 2 washing pans; levelling stand; reversing frame; glass measures; scales and weights; funnel; filter ring; supply of positive paper; bibulous paper; tripod stand, with brass top; with all requisite chemicals, in stoppered bottles, and materials; the whole packed in case, with lock and key . . .	15	0	0
No. 7.	**Complete Set of Apparatus for Collodion pictures, 8½ by 6½ inches, 6 by 5 inches, and 5 by 4 inches;** comprising mahogany sliding body camera, of best construction, with one dark slide, and three loose frames for glass plates, ground focussing glass, &c., fitted with double-combination achromatic lens, of Bland and Long's own manufacture, in which the chemical and optical foci are perfectly coincident, mounted in handsome brass front, with rack and pinion adjustment; 1 doz. plates, 8½ by 6½ inches, in box; 1 doz. plates, 6 by 5 inches, in box; 1 doz. plates, 5 by 4 inches, in box; gutta percha bath and dipper; 2 washing pans; levelling stand; reversing frame; glass measures; scales and weights; with a full supply of all the necessary chemicals, tripod stand, &c., complete, packed in stout case, with lock and key	30	0	0

ESTIMATES

OF

Complete Sets of Photographic Apparatus.

FOR THE PAPER PROCESSES ONLY.

		£	s.	d.
No. 1.	**Complete Set of Photographic Apparatus,** for taking pictures by the Calotype or waxed-paper process, 6 by 5 inches; consisting of mahogany camera, fitted with single achromatic lens, 1¾ inches diameter, mounted in brass front; single dark slide for prepared paper; porcelain dish; preparing board; glass rod; reversing frame; 1 quire of photographic paper; 1 quire of bibulous ditto; set of scales and weights; 1 oz. measure; minim ditto; tripod stand; and all the necessary chemicals, &c., in stoppered bottles; the whole packed in case, with lock and key . . .	5	5	0
No. 2.	**Complete Set of Photographic Apparatus,** for taking pictures by the calotype or the waxed-paper process, 7 by 6 inches; consisting of mahogany camera, fitted with single achromatic view lens, 2¼ inches diameter, mounted in brass front; single dark slide for prepared paper; ground focussing glass; 2 porcelain dishes; board for the preparation of paper; 2 glass rods; reversing or printing frame; tripod stand for supporting the camera; 2 quires of photographic paper; 2 quires of bibulous ditto; scales and weights; glass measures; funnel; with all the necessary chemicals, &c.; the whole packed in case, with lock and key	6	16	6
No. 3.	**Complete Set of Photographic Apparatus,** for taking pictures 9 by 7 inches, by either the calotype or waxed paper process; comprising mahogany camera, fitted with single achromatic view lens, 2⅝ inches diameter, mounted in brass front; 1 double back for prepared paper; ground focussing screen; tripod stand for supporting camera; 2 porcelain dishes; preparing board; 2 glass rods; reversing or printing frame, for obtaining positives; 2 quires of photographic paper; 2 quires of bibulous ditto; scales and weights; glass measures and funnels; with all the necessary chemicals, complete; the whole *packed in case,* with lock and key . . .	10	10	0

	£	s.	d
No. 4. **Portable Photographic Apparatus,** consisting of a folding camera of best construction, with ground focussing glass; 1 double back for prepared paper; fitted with single achromatic lens, 2¼ inches diameter, mounted in brass front, sliding adjustment for foreground and sky, adapted for taking pictures by the calotype or waxed-paper process, 7 by 6 inches; tripod stand for supporting the camera; 2 porcelain washing pans; preparing board; 2 glass rods; reversing frame; glass graduated measures and funnels; 2 quires of photographic paper; 1 quire of albumenized ditto; 1 quire of bibulous ditto; scales and weights, with glass pans; and a full supply of chemicals; the camera and lens packed in leather swing case, for convenience of carriage; the chemicals and other apparatus in case, with lock and key	13	13	0
No. 5. **Portable Photographic Apparatus,** comprising folding camera of best construction; ground focussing glass; 1 double back for prepared paper 9 by 7 inches; fitted with single achromatic view lens, 2⅝ inches diameter, mounted in brass front, with adjustment for foreground and sky; tripod stand, for supporting the camera; preparing board; 2 glass rods; 1 ounce glass graduated measure; minim ditto; 2 glass funnels; 2 porcelain pans for washing paper; reversing or printing frame; set of scales and weights, with glass pans; 3 quires of photographic paper; 2 quires of albumenized ditto; 2 quires of bibulous ditto; with a full supply of chemicals, &c. The camera, with back and lens, packed in leather sling case, for convenience of carriage; the chemicals and other apparatus in strong case, with lock and key	16	16	0
No. 6. **Portable Photographic Apparatus,** consisting of folding camera of best construction, ground focussing glass; 1 double back for prepared paper, 11 by 9 inches; fitted with single achrometic view lens, 3 inches diameter, mounted in brass front with rackwork adjustment; sliding front to camera, for adjusting proportion of foreground and sky; tripod stand for supporting the camera; 2 porcelain pans for washing paper; preparing board; 2 glass rods; glass graduated measures; glass funnels; reversing or printing			

	£	s.	d.
frame; set of scales and weights, with glass pans; 8 quires of photographic paper; 3 quires of albumenized ditto; 3 quires of bibulous ditto; with a full supply of chemicals for the calotype or waxed-paper process: the camera and lens packed in leather sling case, for convenience of carriage; the chemicals and other apparatus in strong case, with lock and key	22	10	0

ESTIMATES

FOR

Complete Sets of Photographic Apparatus.

FOR THE COLLODION AND PAPER PROCESSES COMBINED.

	£	s.	d.
No. 1. **Complete Set of Photographic Apparatus,** for taking portraits by the collodion process, 4¼ by 3¼ inches, and views or landscapes 6 by 5 inches, on either calotype or waxed-paper; comprising a sliding body French-polished mahogany camera, with 1 single back for paper, and 1 single back with loose frames for collodion plates; fitted with compound achromatic lens, of Bland and Long's own make, which is adapted for either portraits or views; tripod stand; scales and weights; levelling stand; gutta percha bath and dipper; 1 dozen glass plates in box, 4¼ by 3¼ inches; 1 dozen ditto in box, 3¼ by 2¾ inches; reversing or printing frame; 2 glass graduated measures; 2 funnels; glass rods; preparing board; 2 porcelain washing pans; 1 quire of photographic paper; 1 quire of albumenized ditto; 1 quire of bibulous ditto; and a supply of chemicals both for collodion, and calotype or waxed-paper process; the whole packed in case, with lock and key	11	10	6
No. 2. **Complete Set of Photographic Apparatus,** for taking portraits on collodion 5 by 4 inches, and views or landscapes 7 by 6 inches, on either calotype or waxed-paper; consisting of mahogany French-polished sliding body camera, with 1 single back for paper 7 by 6 inches, and 1 single *back for collodion* plates; 2 loose frames, 5 by 4			

		£	s.	d.
	inches, and 4 by 3 inches; fitted with compound achromatic lens, of Bland and Long's own make, which is adapted for either portraits or views; tripod stand; scales and weights; levelling stand; gutta percha bath and dipper; 1 dozen glass plates in box, 5 by 4 inches; 1 dozen ditto in box, 4 by 3 inches; reversing frame; 2 glass graduated measures; preparing board; 2 pans for washing; 1 quire of photographic paper; 1 quire of albumenized ditto; 1 quire of bibulous ditto; 2 glass funnels; and a good supply of chemicals in stoppered bottles, consisting of nitrate of silver, iodide of potassium, gallic acid, acetic acid, varnish, hyposulphite of soda, iodized collodion, pyrogallic acid, chloride of sodium, cyanide of potassium, nitrate of silver bath, &c.; the whole packed in case complete, with lock and key	15	0	0
No. 3.	Ditto, ditto, same as above, but with portable folding camera, of best construction, with one double back for paper, and one single back for collodion plates	16	5	0
No. 4.	**Complete Set of Photographic Apparatus,** for taking portraits on collodion 6 by 5 inches, and views or landscapes 9 by 7 inches, on calotype or waxed paper; comprising a mahogany French-polished sliding body camera, with one single back for paper 9 by 7 inches, and one single back with two loose frames for collodion plates 6 by 5 inches, and 5 by 4 inches, fitted with compound achromatic lens of Bland and Long's own make, which is adapted for both portraits and views; tripod stand; scales and weights; levelling stand; gutta percha bath and dipper; 1 dozen glass plates, 6 by 5 inches, in box; 1 dozen ditto, 5 by 4 inches, in box; reversing frame; 2 glass graduated measures; preparing board; glass rods: 2 porcelain washing pans; 2 quires of photographic paper; 2 quires of albumenized ditto; 2 quires of bibulous ditto; 2 glass funnels; and a good supply of chemicals required in both processes; the whole carefully packed in case, with lock and key	19	19	0
No. 5.	Ditto, ditto, same apparatus, &c., as above, but with portable folding camera of best construction, with one double back for paper, and one single back for collodion plates	21	0	0

	£	s.	d.
No. 6. **Complete Set of Photographic Apparatus,** for taking portraits on collodion plates 8½ by 6½ inches, and views or landscapes 11 by 9 inches, on either calotype or waxed papers. Comprising mahogany sliding body camera, French-polished, with one single back for paper 11 by 9 inches, and one single back for glass plates, with two loose frames 8½ by 6½ inches, and 6 by 5 inches; fitted with compound achromatic lens, of Bland and Long's own make, which is adapted for either portraits or views; tripod stand; scales and weights; levelling stand; gutta percha bath and dipper; 1 dozen plates in box, 8½ by 6½ inches; 1 dozen ditto 6 by 5 inches, in box; reversing frame; 2 glass graduated measures; preparing board; 2 glass rods; 2 pans for washing; 3 quires of photographic paper; 3 quires of albumenized ditto; 3 quires of bibulous ditto; 2 funnels; and an ample supply of all the requisite chemicals for both processes, in stoppered bottles; the whole packed in strong case, with lock and key	35	0	0
No. 7. Ditto, ditto, same as above, but with portable folding camera of best construction, with one double back for paper, and one single back for collodion plates	37	0	0

Estimates given for complete Sets, *for any single process, or combination of processes, not enumerated in the above list.*

ESTIMATES FOR COMPLETE SETS OF DAGUERREOTYPE APPARATUS.

(The following prices do not include a supply of silvered plates.)

		£	*s.*	*d.*
No. 1.	**Set of Daguerreotype Apparatus,** for taking pictures 4½ by 3½ inches, 3½ by 2¾ inches, and 2½ by 2 inches; consisting of No. 1 walnut sliding body camera, with single achromatic lens, mounted in brass front, dark slides for plates, ground focussing glass, &c.; bromine and iodine pans, with air-tight glass covers, and set of frames; 3 plate holders; 3 plate boxes; 2 velvet polishing buffs; mercury box, with thermometer; porcelain washing tray; gilding stand, with levelling screws; improved pliers; glass spirit lamp; funnel; filtering paper; with all the necessary chemicals and polishing materials, in hard wood boxes. The whole packed in two stained cases, with locks and handles . . .	6	6	0
	Ditto, of superior construction	10	10	0
	If with compound achromatic lens, and double iodine and bromine boxes, forming a more complete set of apparatus	15	15	0
No. 2.	**Complete Set of Daguerreotype Apparatus,** for portraits from 2¾ by 3¼ inches, up to 6½ by 4¾ inches, with best compound achromatic lens, mounted in handsome brass front, rackwork adjustment; sliding body camera of mahogany, with dark frames, focussing glass, &c.; improved compound iodine and bromine box; 2 polishing buffs; 4 plate boxes; 4 polishing blocks; head rest; mercury box, with thermometer; washing tray; gilding stand; improved pliers; spirit lamp; funnel and filter paper; hard wood boxes, containing polishing materials, with all the necessary chemicals and materials. The whole packed in two stained wood cases, with locks and handles	23	0	0
No. 3.	**Complete Set of Daguerreotype Apparatus,** for taking pictures up to 8½ by 6½ inches; consisting of sliding body camera, with dark frames, focussing glass, &c.; compound achromatic lens,			

		£	s.	d.
	mounted in handsome brass front, with rackwork adjustment; compound iodine and bromine apparatus, complete; polishing buffs; plate boxes; polishing blocks; camera stand; head rest; mercury box; washing pans; gilding stand; improved pliers; spirit lamp; funnels; polishing boxes; filtering paper, &c.; with a good supply of all the necessary chemicals, materials, &c. The whole carefully packed in two cases, with locks and handles	40	0	0
No. 4.	**Complete Set of Daguerreotype Apparatus,** suitable for a Public Institution or a professional Photographer; comprising large camera, with necessary slides for plates, ground focussing glass, combination achromatic lens, mounted in handsome brass front, with rackwork adjustment, for taking portraits, groups, or views up to 8½ by 6½ inches; also a small camera, with short focus double combination achromatic lens of large aperture, for taking portraits up to 4¼ by 3¼ inches in dull weather: polishing lathe, with circular buffs; 3 hand buffs; set of metal plate holders; heating stand: large bromine and iodine apparatus; set of plate boxes; camera stand; head rest, for chair; also head rest with heavy iron foot, for full length portraits; mercury box, for different sized plates; lamp, with yellow glass shade; one gallon still, and worm tub complete; gilding stands; stoneware filter; porcelain dishes and filter stands; funnels and filtering paper; spirit lamps; Daguerreotype colours and brushes; india-rubber bottle; glass measures: 2 painted backgrounds; with a full supply of chemicals, polishing materials, &c., complete	110	0	0

H. Silverlock, Printer, Doctors' Commons, London.

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